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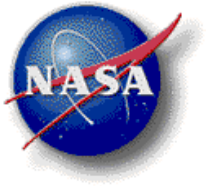
Section C

Aircraft Maintenance and Operational Support Statement of Work

Flight Crew Operations Directorate
Aircraft Operations Division

Solicitation # TBD
June 17, 2011



National Aeronautics and Space Administration
Lyndon B. Johnson Space Center
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Preface

During the period of performance of the Aircraft Maintenance and Operational Support (AMOS) contract, National Aeronautics and Space Administration (NASA) aircraft operations will be in a period of transition with the retirement of the Space Shuttle Program and the beginning of new NASA missions. Although there are few certainties during this transition period, this contract will support a core astronaut competency which includes aircraft spaceflight readiness training. Additionally, this contract will continue to support NASA airborne science research. Although it is anticipated that some areas of the contract will see a reduction in effort, such as the retirement of some aircraft, NASA anticipates that other areas of the contract may see an increase in effort such as airborne science research.

Given this changing climate, it is imperative that the Contractor maintain a dynamic and creative workforce in order to adapt quickly to the evolving NASA mission.

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1.0 Introduction

1.1 Overview

This Statement of Work (SOW) describes the work to be performed and the deliverables to be provided by the Contractor under the Aircraft Maintenance and Operational Support (AMOS) contract. The Contractor shall manage its workforce to ensure that quality products and safe services are provided to NASA and NASA customers for the life of the contract.

1.2 Requirements Definition

The following definitions differentiate between requirements and other statements contained in this statement of work:

Shall	This is the only verb used for binding requirements.
Should/May	These verbs are used for stating non-mandatory goals.
Will	This verb is used for stating facts or declaration of purpose.

1.3 Contract Structure

The AMOS contract is a hybrid contract comprised of two contract types, a fixed-price (FP) award fee portion and a cost-reimbursable (Cost) award fee portion. The Contractor shall:

1) Execute the contract in accordance with the requirement categories and definitions identified in Table 1-1 below. Requirement categories are listed under each applicable paragraph heading in the statement of work beginning in SOW Subsection 4.0.
2) Ensure that work performed under the fixed-price portion of the contract is not charged to the cost-reimbursable portion of the contract.

Table 1-1: Requirement Categories

Category	Definition
FP	• The Contractor shall perform all labor under the fixed-price (FP) portion of the contract. • All *non-labor resources*[1] shall be cost-reimbursable.
FP/Cost	• For all support equipment, aviators life support equipment, and T-38 aircraft: - The Contractor shall perform all organizational, intermediate, and depot level labor supported by approved technical data[2, 3] under the fixed-price portion of the contract.[4] - The Contractor shall perform all labor not supported by approved technical data[2] under the cost-reimbursable portion of the contract • For all other aircraft: - The Contractor shall perform all labor under the cost-reimbursable portion of the contract. • All non-labor resources shall be cost-reimbursable.
Cost	• The Contractor shall perform all labor under the cost-reimbursable portion of the contract. • All non-labor resources shall be cost-reimbursable.
General	• General contract requirement or background information not suited for a specific category assignment

[1] *See SOW Appendix B for a definition of the term "non-labor resources."*
[2] *See SOW Subsection 1.4 for definitions of the terms "supported" and "not supported" by approved technical data.*
[3] *See SOW Subsection 1.4 for a definition of the term "technical data."*
[4] See SOW *Appendix B for definitions of the terms "organizational," "intermediate," and "depot" level maintenance.*

1.4 Work Supported or Not Supported by Approved Technical Data

1.4.1 Definitions

For the purposes of this statement of work, the Contractor shall use the following definitions:

1) *Supported by approved technical data* is defined as any maintenance activity where approved technical data exists per Appendix C.[5]
2) *Not supported by approved technical data* is any maintenance activity where:
    a. Approved technical data does not exist per Appendix C;
    b. Technical data prohibits repair in-house; or
    c. The technical data instructs the Contractor to seek additional subject matter expert guidance (e.g.[6] AOD Form 14, *Engineering Work Order*) before the maintenance action can be completed.[7]
3) *Technical Data* refers to computerized maintenance program (CMP) cards, NASA/Department of Defense (DoD) technical orders and work cards, manufacturer's maintenance manuals, Aircraft Operations Division (AOD) unique work instructions (WIs), engineering work orders (EWOs), fleet modification instructions (FMIs), engineering drawings, test procedure – flight research project (TP-FRP) instructions, Federal Aviation Authority (FAA)-approved original equipment manufacturer (OEM) standards, aircraft change directives (ACDs) (e.g. airworthiness directives, service bulletins, etc) and any other subscriptions, data, and specifications necessary in order to service, repair, and keep aircraft and their related systems in an airworthy and serviceable condition.
4) *Touch Labor* is defined as hands-on labor related directly to maintaining, manufacturing, upgrading, processing, or testing.

[5] *For example, labor to replace the T-38 44% spar attachment fitting per Technical Order (T.O.) 1T-38A-3, Paragraph 2.116 would be performed under the fixed-price portion of the contract.*
[6] *The abbreviation "e.g." as used in this statement of work means "for example."*
[7] *For example, an aircraft structural crack has exceeded T.O. limits for the repair and engineering must be contacted for disposition.*

1.4.2 Process[8]

For all Johnson Space Center requirements that are:

1) T-38 aircraft touch labor (e.g. SOW Subsection 7.4.1);
2) Support equipment touch labor (e.g. SOW Subsections 7.4.3 and 7.6.3); or
3) Aviator's life support systems touch labor (e.g. SOW Subsection 7.4.2).

That is:

1) Believed by the Contractor to be "not supported" by approved technical data; and
2) Is a requirement categorized as "FP" or "FP/Cost" per SOW Subsection 1.3.

The Contractor shall:

1) Follow the process outlined in SOW Subsection 10.2.2 to determine that the work is "not supported" by approved technical data;
2) Complete an applicable AOD form (e.g. AOD Form 14, *Engineering Work Order*) to include technical requirements and labor hour estimates, and receive NASA signature approval prior to performing any touch labor under the cost-reimbursable portion of the contract;[9]
3) Archive the applicable AOD form in the NASA Aircraft Management Information System (NAMIS) per SOW Subsection 7.2.1; and
4) Perform only that portion of the touch labor approved to be "not supported" by approved technical data under the cost-reimbursable portion of the contract. Perform all other touch labor under the fixed-price portion of the contract.[10]

[8] *This process does not apply to Langley Research Center.*
[9] *AOD forms will be prepared by either the Contractor or NASA per NASA directive. In either case, the Contractor shall be required to review the AOD form content and provide labor hour estimates to complete the work.*
[10] *For example, during a T-38 maintenance inspection, a structural crack is detected on step 10 of a 20 step process. The crack's dimensions are found to exceed the approved technical data repair limits. Consequently, an AOD Form 14, Engineering Work Order (EWO) is generated to provide instructions to repair the crack. The touch labor to complete the engineering work order will be accomplished under the cost-reimbursable portion of the contract. The touch labor for the remaining inspection steps, 11 through 20, will be accomplished under the fixed-price portion of the contract.*

1.5 Background

1.5.1 Johnson Space Center

Located in Houston, Texas, Ellington Field, shown in Figure 1-1, was built in 1917 to train pilots for combat in the First World War. Since then, the airfield has functioned in a variety of operational roles; as an active duty base, an Air Force Reserve base, and an Air National Guard base. Since 1962, Ellington Field has been the home for all NASA Johnson Space Center (JSC) astronaut flight training. In 1984, the city of Houston purchased Ellington Field and the airfield remains active today serving NASA, military, commercial, and general aviation needs.

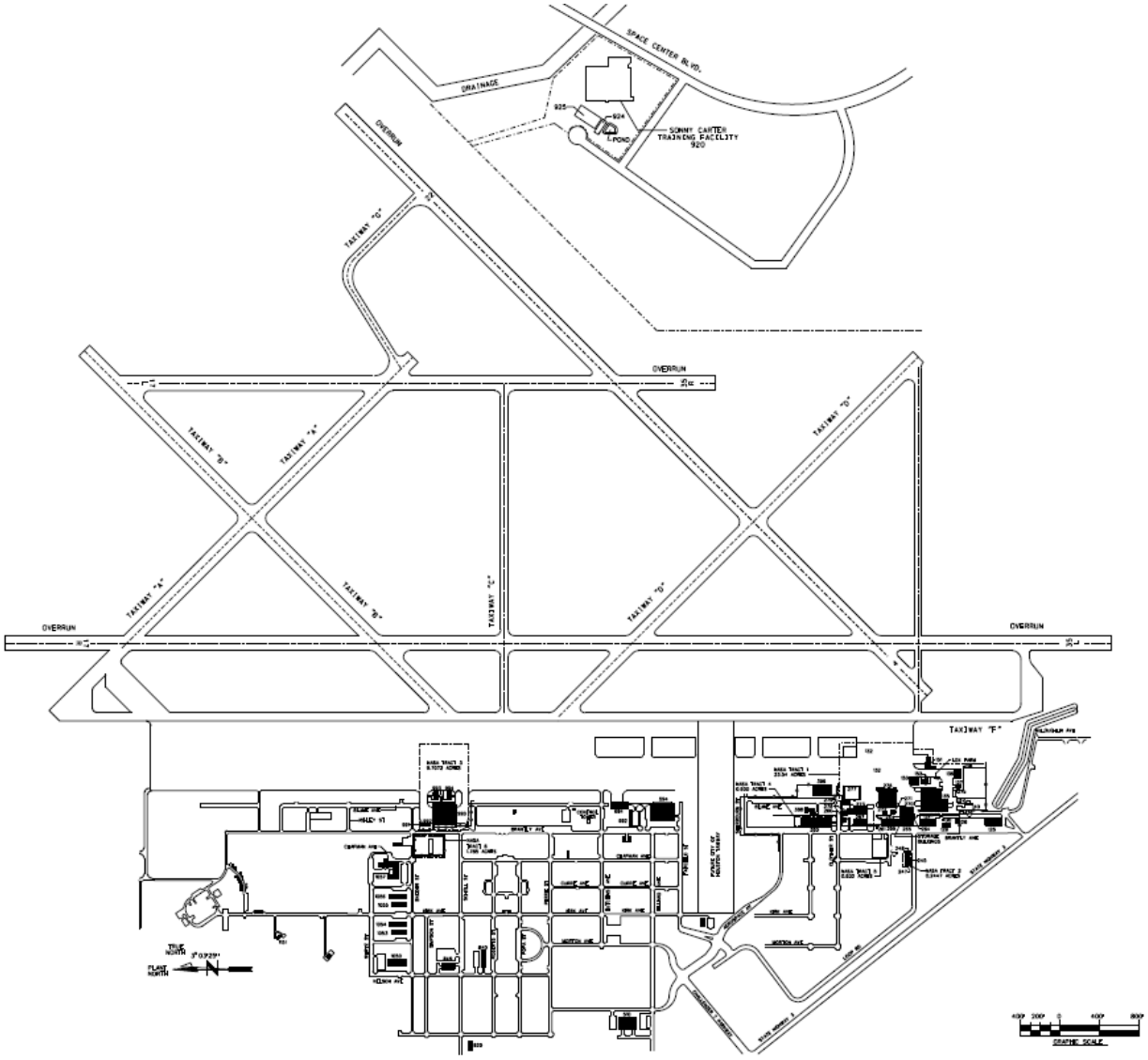

Figure 1-1: Ellington Field

1.5.1.1 JSC Managed Facilities

The facilities and shops listed in Table 1-2 through Table 1-4 are managed by the Johnson Space Center (JSC):

Table 1-2: Ellington Field (EFD) Facilities

Shop or Facility	Location and Building	Remarks
Administration Office	EFD, Building 273	NASA Maintenance, IT, Contractor Administration
Aircraft Test Article Facility	EED, Building 142	
Battery Shop	EFD, Building 135	
Corrosion/Paint Shop	EFD, Building 136	
Egress Shop	EFD, Building 271	Maintain T-38/WB-57 pyrotechnics for egress systems
Electric Shop	EFD, Building 135	
Electronics Lab	EFD, Building 135	
Engine Shop	EFD, Building 135	
Engineering	EFD, Building 135	
Flight Line/Ramp	EFD, EDW, ELP	
Fuel Cell Maintenance	EFD, Building 150	
Ground Support Equipment Shop	EFD, Building 278	
Hangar 135	EFD, Building 135	G-II, G-III, STA Maintenance, QC/QA, Engineering
Hangar/Docks 276	EFD, Building 276	T-38 Maintenance
Hangar 990	EFD, Building 990	DC-9, WB-57F Maintenance, and WB-57 Program Office
Hydraulic Shop	EFD, Building 276	
Jet Engine Test Facility	EFD, Building 140	
Mechanical Accessories Shop	EFD, Building 272	
NASA Division Office, Flight Operations and Safety Office	EFD, Building 276	
Nondestructive Inspection (NDI) Testing Lab	EFD, Building 150	
Personal Equipment Shop	EFD, Building 276	Maintain aircrew pyrotechnics
Pressure Suit Shop	EFD, Building 990	
Production Control	EFD, Building 276	
Quality Offices	EFD, Building 267	NASA Government Quality Assurance (QA), Contractor Quality Control (QC)
Sound Suppression Facility	EFD, Building 151	
Sheet Metal Shop	EFD, Building 135	

Shop or Facility	Location and Building	Remarks
Supply Building 333	JSC Site, Building 333—Partial Use/Shared with other NASA Contractors	
Supply Building 338	JSC Site, Building 338—Partial Use/Shared with other NASA Contractors	
Supply Building 993	EFD, Building 993 (Reduced Gravity Facility)	
Supply Building 994	EFD, Building 994 (WB-57 Special Projects)	
Supply- Class B And C Explosives	EFD, Building E270	Storage for pyrotechnics
T-38 Simulator	JSC Site, Building 5	
Tire and Wheel Shop	EFD, Building 137	
Tire and Wheel Storage	EFD, Building 137B	
Warehouse, Building 265	EFD, Building 265	Storage for pyrotechnics
Warehouse, Building 266	EFD, Building 266	
Warehouse, Building 270	EFD, Building 270	
Warehouse, Building 380	EFD, Building 380	
Welding Shop	EFD, Building 279	
Aircraft Wash Rack	EFD, Building 280	

Table 1-3: El Paso (ELP) Facilities[11]

Shop or Facility	Location and Building	Remarks
Hangar 8101	ELP, Building 8101	T-38, G-II, G-III, STA and 377 Super Guppy Maintenance
Hangar 8102	ELP, Building 8102	T-38 Maintenance (depot)

Table 1-4: Edwards Air Force Base (EDW) Facilities

Shop or Facility	Location and Building	Remarks
Building 4859	EDW/DFRC	Administration
Shuttle Handling Area "Area-A"	EDW/DFRC	Shuttle Support (747 aircraft)

[11] *See SOW Subsection 7.8.1 regarding El Paso depot requirements.*

1.5.1.2 JSC Assigned Aircraft

Aircraft currently assigned to JSC are shown in Table 1-5.[12]

Table 1-5: JSC Aircraft and Engine Assignments

Qty	Type Aircraft	Mission	Type Engine	Location
21 - 16[13, 14. 15]	Northrop T-38N	Program Support Aircraft, Space Flight Readiness Training	General Electric J-85-5	JSC, Houston, Texas (Ellington Field)
3[16]	General Dynamics WB-57F	Program Support Aircraft, Life Science	Pratt and Whitney TF-33-P11	JSC, Houston, Texas (Ellington Field)
1	B377 SGT Super Guppy	Program Support Aircraft, Life Sciences	Allison 501-D22C	El Paso, Texas
2[17]	Boeing 747	Program Support Aircraft, Shuttle Carrier Aircraft (SCA)	Pratt and Whitney JT9D-7J	DFRC, Edwards Air Force Base (EDW), California
1	Boeing DC-9	Program Support Aircraft	Pratt and Whitney JT-8D-9	JSC, Houston, Texas (Ellington Field)
1	Gulfstream G-III	Program Support, Mission Management Aircraft	Rolls Royce Spey MK511-8	JSC, Houston, Texas (Ellington Field)
1	Gulfstream STA	Shuttle Training and Program Support Aircraft	Rolls Royce Spey MK511-8	JSC, Houston, Texas (Ellington Field)
1[18]	Bombardier Global Express XRS	Program Support Aircraft	Rolls-Royce Deutschland BR710A2-20	JSC, Houston, Texas (Ellington Field)

[12] *JSC may add or remove aircraft during the contract period of performance. The added or removed aircraft may be the same aircraft types shown in Table 1-5 or different aircraft types. If T-38 aircraft are added, refer to Section TBD, Subsection TBD for contract options. If aircraft other than T-38's are added, these aircraft will be included in the cost-reimbursable portion of the contract until an evaluation can be made by both NASA and the Contractor to determine if the aircraft type is appropriate for the fixed-price portion of the contract. See SOW Subsection 1.3 for a description of the contract structure.*

[13] *NASA anticipates that at contract start there will be twenty-one (21) T-38 aircraft. NASA estimates that one (1) T-38 aircraft may be retired for preservation per year down to a minimum of sixteen (16) aircraft.*

[14] *NASA anticipates the T-38 utilization rate will be no more than thirty (30) flight hours per aircraft per month.*

[15] *One (1) T-38 aircraft will initially be reserved by NASA as a dedicated project aircraft. The Contractor shall not rely on this aircraft for normal flight operations scheduling.*

[16] *NASA anticipates that a 3rd WB-57 will become fully operational during the 4th quarter of calendar year 2012. Prior to this date, NASA expects that the Contractor shall be required to support some activities (e.g. maintenance, logistics and quality control) to assist in the 3rd aircraft's refurbishment.*

[17] *NASA anticipates that the Boeing 747s will be retired or reassigned following the end of the Space Shuttle program and the relocation of the Shuttle Orbiters to their final exhibition locations.*

[18] *Bombardier Global Express XRS aircraft assignment is pending.*

1.5.1.2.1 Northrop T-38N

The T-38A "Talon" is a two-place, twin turbojet, swept-wing, supersonic aircraft originally designed for the United States Air Force as a high performance trainer. NASA currently uses a modified version of the Air Force T-38A aircraft designated the T-38N shown in Figure 1-2. The T-38N is used for astronaut space flight readiness training, and is fully aerobatic.

NASA currently operates twenty-one T-38N aircraft based at Ellington Field in Houston, Texas.

Figure 1-2: Northrop T-38N

1.5.1.2.2 General Dynamics WB-57

The WB-57, shown in Figure 1-3, is a mid-wing, long range aircraft capable of operation for extended periods of time from sea level to altitudes well in excess of 60,000 feet. The WB-57 can fly for approximately 6.5 hours and has a range of approximately 2,600 miles. The WB-57 can carry up to 8,800 pounds (lbs) of payload. Two crewmembers are positioned at separate tandem locations with the pilot sitting in the front and sensor equipment operator sitting in the rear.

Figure 1-3: General Dynamics WB-57

1.5.1.2.3 Airbus Industries Super Guppy Transport

The Super Guppy Transport (SGT) aircraft, shown in Figure 1-4, was acquired by NASA from the European Space Agency and was manufactured by Airbus Industries in 1983. The SGT is the latest version in a long line of Guppy cargo aircraft used by NASA, and is designed to transport oversized cargo.

The SGT, also designated 377SGT-F, has a cargo compartment that is 25 feet tall, 25 feet wide and 111 feet long. The aircraft has a unique hinged nose that can open more than 200 degrees, allowing large pieces of cargo to be loaded and unloaded from the front. The maximum takeoff weight is 170,000 lbs, and maximum range is 1,730 NM.

Figure 1-4: Airbus Industries Super Guppy

1.5.1.2.4 Boeing 747 – Shuttle Carrier Aircraft

NASA operates two Shuttle Carrier Aircraft (SCAs). These aircraft, one shown in Figure 1-5, are extensively modified Boeing 747 airliners. NASA maintains one 747-100 model and one short range 747-100SR.

The SCAs are used to ferry space shuttles from landing sites back to the launch complex at the Kennedy Space Center. The orbiters are placed on top of the SCAs by large gantry-like structures that hoist the orbiters off the ground for post-flight servicing, and then mate them with the SCAs for ferry flights.

Flying with the additional drag and weight of the Orbiter imposes significant fuel and altitude penalties. The range is reduced to 1,000 nautical miles, compared to a commercial non-stop range of 5500 nautical miles, requiring an SCA to stop several times to refuel on a transcontinental flight. The SCA has an altitude ceiling of 15,000 feet and a maximum cruise speed of Mach 0.6 with the orbiter attached.

Figure 1-5: Boeing 747 Shuttle Carrier Aircraft

1.5.1.2.5 McDonnell Douglas DC-9

The C-9, shown in Figure 1-6, was acquired by NASA from the U.S. Navy in 2003. It is the military version of the McDonnell Douglas DC-9 used for many years by the commercial airlines. The U.S. Navy utilized the C-9 aircraft in support of passenger transportation, medical evacuation and special missions.

The primary mission of the NASA C-9 is to provide support for the movement of the shuttle from landing sites in California and New Mexico back to Kennedy Space Center, Trans-Atlantic Landing support and the Emergency Mission Control Move mission. Future use of the aircraft will include movement of cargo both domestically and internationally in support of US space operations.

The NASA C-9 has a maximum gross take-off weight of 110,000 lb and will be fitted with auxiliary fuel tanks installed in the lower cargo hold to augment the aircraft's range to nearly 2,600 nautical miles for overseas missions.

Figure 1-6: McDonnell Douglas DC-9

1.5.1.2.6 Gulfstream III – Mission Management Aircraft

JSC operates one program support/mission management aircraft (MMA), shown in Figure 1-7, in support of US space operations. The Gulfstream III was built by Gulfstream Aerospace Corp. In its commercial versions, the G-III's basic role is that of an executive business aircraft that can carry up to 15 passengers. The C-20B version currently flown by the Air Force serves in a similar capacity for high-level Government and military officials.

The G-III's maximum takeoff weight with full fuel and passengers/cargo is 69,700 lbs. Empty, the unmodified airplane weighs about 38,000 lbs. The aircraft has a wingspan of just over 77 feet, is about 83 feet long and just over 24 feet tall. Normal cruise for the aircraft is 459 knots, and its top speed is 501 knots (Mach 0.85). Its maximum operating altitude is 45,000 feet. The Gulfstream-III has a range with a full load of passengers or equipment of about 3,400 nautical miles.

Figure 1-7: Gulfstream GIII

1.5.1.2.7 Gulfstream – Shuttle Training Aircraft

The Shuttle Training Aircraft (STA), shown in Figure 1-8, is a NASA training vehicle that duplicates the Space Shuttle's approach profile and handling qualities, which allows Space Shuttle pilots to simulate Shuttle landings under controlled conditions before attempting the task on board the orbiter.

The aircraft's exterior has been modified to withstand the high aerodynamic forces incurred during training sorties. A redesigned cockpit provides a high-fidelity simulation of the Shuttle Orbiter's controls and pilot vantage point. An onboard computer called the Advanced Digital Avionics System (ADAS) controls the Direct Lift Control (DLC) and the in-flight reverse thrust during Simulation Mode.

In order to match the descent rate and drag profile of the real Shuttle at 35,000 feet, the main landing gear is lowered (the nose gear stays retracted due to wind load constraints) and engine thrust is reversed. The aircraft’s flaps may deflect upwards to decrease lift as well as downwards to increase lift.

Figure 1-8: Gulfstream Shuttle Training Aircraft

1.5.1.2.8 Bombardier Global Express XRS[19]

The Global Express XRS is the ultra long-range business jet developed by Bombardier Aerospace. The aircraft has a cruise speed just below sonic level at Mach 0.88 and is capable of using first class or secondary airports and basic short airfields in remote areas.

It is anticipated that NASA may operate an ultra long-range Bombardier Global Express XRS, such as the one shown in Figure 1-9, that includes a forward fuel tank to extend the aircraft range to 11,390km (6,150nm) at Mach 0.85.

The aircraft has both gravity and pressure refueling. It carries a maximum fuel load of 19,663 kg (20,400 kg for the XRS) in integral wing tanks, a center section tank and an auxiliary tank in the rear fuselage section.

Figure 1-9: Global Express XRS[20]

[19] *Bombardier Global Express XRS aircraft assignment is pending.*
[20] *Example photo – not a NASA aircraft.*

1.5.1.2.9 T-38N Simulator

The T-38N simulator, shown in Figure 1-10 and Figure 1-11, is ground based (no motion) and is located on-site at Johnson Space Center in Building 5. The simulator is configured with a cockpit taken from a NASA T-38 aircraft and modified to meet simulator training requirements.

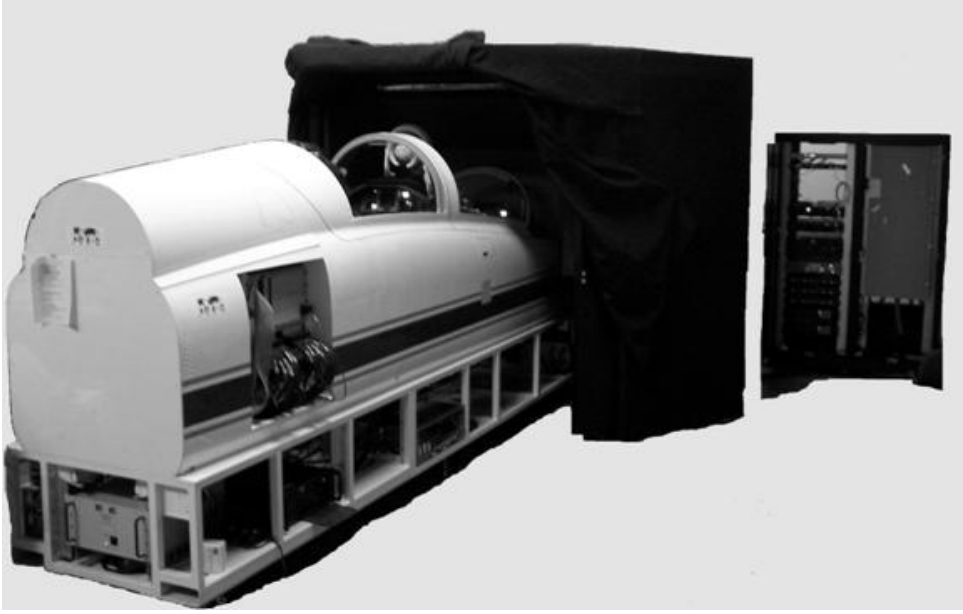

Figure 1-10: T-38N Simulator

Figure 1-11: T-38N Simulator, Cockpit View

1.5.2 Langley Research Center

Langley Research Center (LaRC) is the oldest of NASA's field centers. Located in Hampton, Virginia, Langley was established in 1917 by the National Advisory Committee for Aeronautics. Langley focuses primarily on aeronautics research although a number of space missions have been designed at the Center. Langley currently has more than forty wind tunnels performing research on improving aircraft and spacecraft safety, performance, and efficiency. Today, two-thirds of Langley's programs involve aeronautics research and the rest concentrate on space research. See Figure 1-12.

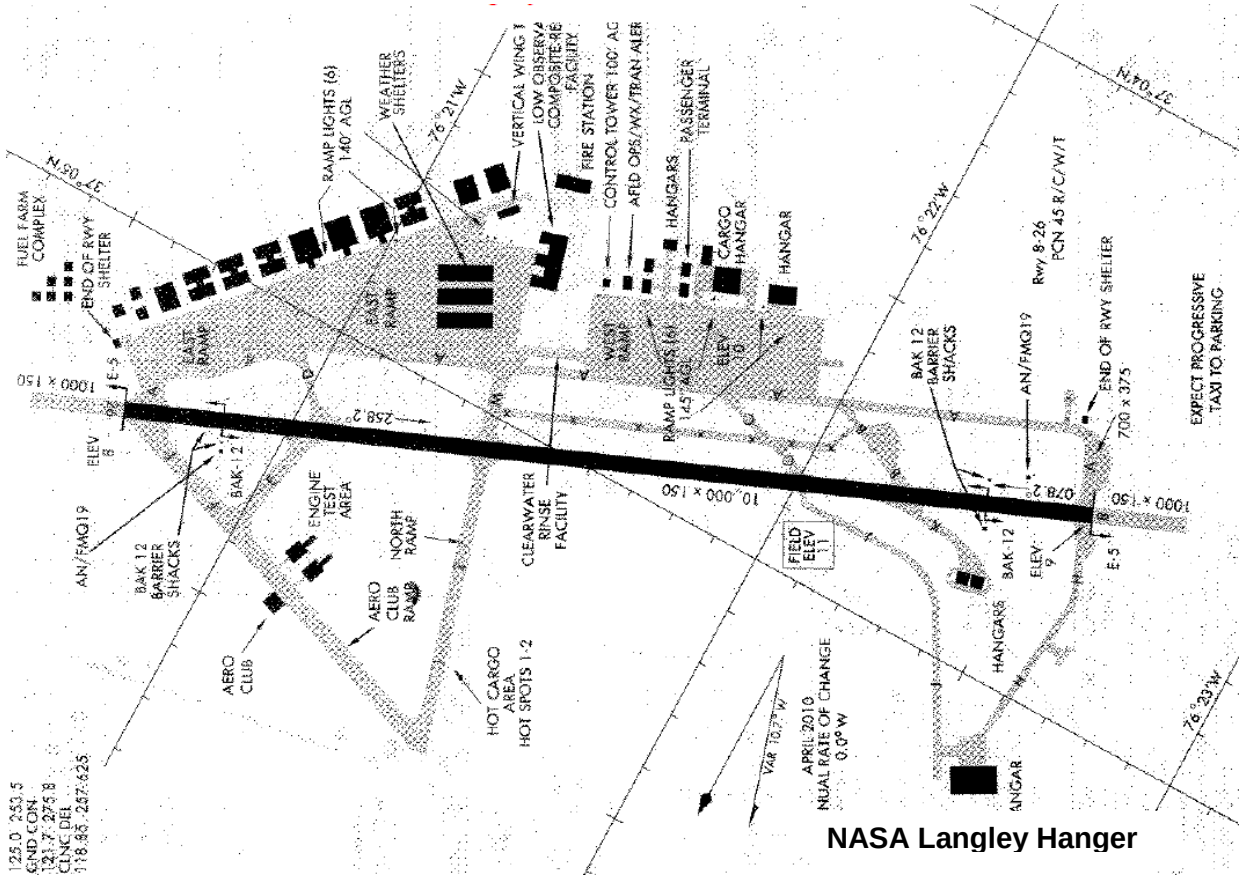

Figure 1-12: Langley Research Center

1.5.2.1 LaRC Managed Facilities

The facilities and shops listed in Table 1-6 are managed by the Langley Research Center (LaRC).

Table 1-6: LaRC Facilities

Shop/Facility	Location/Building	Remarks
Administration Office	LaRC Building 1244	NASA Maintenance, Contract Administration
Battery Shop	LaRC Building 1244	
Electric Shop	LaRC Building 1244	
Fabrication Shop	LaRC Building 1244	
Flight Line/Ramp	LaRC	
Ground Support Equipment Shop	LaRC Building 1244	
Personnel Equipment Shop	LaRC Building 1244	
Quality Assurance Office	LaRC Building 1244	
Supply	LaRC Building 1244	

1.5.2.2 LaRC Assigned Aircraft

Aircraft currently assigned to LaRC are shown in Table 1-7.[21]

Table 1-7: LaRC Aircraft and Engine Assignments

Qty	Type Aircraft	Mission	Type Engine	Location
1	Beechcraft King Air B200	Program Support Aircraft	Pratt & Whitney PT6A-42	LaRC
1	Beechcraft UC-12B Huron	Research Aircraft	Pratt & Whitney PT6A-42	LaRC
1	Cessna 206	Research and Development Aircraft	Lycoming IO-540-AC1A	LaRC
1	Cirrus SR-22	Research and Development Aircraft	Continental IO-550	LaRC
1	Bell UH-1H (in flyable storage)	Program Support Aircraft	Lycoming T-53-L-13B	LaRC
1	Lancair Columbia LC-40 (in flyable storage)	Program Support Aircraft	Continental IO-550	LaRC
1	North American Rockwell OV-10A (in flyable storage)	Research and Development Aircraft	Garrett-AiResearch T-76	LaRC
2	North American Rockwell OV-10G (in flyable storage)	Research and Development Aircraft	Garrett-AiResearch T-76	LaRC

[21] *LaRC may add or remove aircraft during the contract period of performance. The added or removed aircraft may be the same aircraft types shown in Table 1-7 or different aircraft types.*

1.5.2.2.1 Beechcraft B200 King Air and UC-12B Huron

The NASA-Langley B200 King Air (NASA 529) and UC-12B Huron, shown in Figure 1-13, are turbine, twin-engine research aircraft. Pressurized for flight above 30,000 ft, their fuel endurance can take them halfway across the United States. The aircraft are fully IFR capable. These aircraft are excellent platform aircraft for low-medium altitude programs.

Figure 1-13: Beechcraft B200 King Air and UC-12B Huron

1.5.2.2.2 Cessna 206H Stationair

The Cessna 206H Stationair, shown in Figure 1-14, is an all-metal, six place, high-wing, single-engine airplane equipped with tricycle landing gear and is designed for general utility purposes. The Model 206H is certified to the requirements of U.S. FAA Federal Aviation Regulation Part 23 through amendment 23-6, including day, night, VFR and IFR. The aircraft has been reconfigured to accommodate a crew of three: a subject pilot, a safety pilot, and a researcher. The subject pilot may sit in either of the two front seats as required by the experiment. The researcher sits in the right aft seat at a researcher workstation.

Figure 1-14: Cessna 206H Stationair

1.5.2.2.3 Cirrus SR22

The Cirrus SR22, shown in Figure 1-15, is a composite construction, single-engine, four-place production general aviation (GA) aircraft manufactured by Cirrus Design of Duluth, Minnesota. The SR22 is one of several new-generation GA aircraft making use of the latest in materials, aerodynamics, avionics, and manufacturing technology. The SR22 aircraft received Federal Aviation Administration (FAA) certification in 2000, with over 600 aircraft having been delivered since that time. One of the innovative design features of the SR22 aircraft is the Cirrus Airframe Parachute System (CAPS). The CAPS is an emergency parachute system that can be deployed by the pilot or a passenger to safely slow and lower the entire airplane to ground if controlled flight is no longer possible.

Figure 1-15: Cirrus SR22

1.5.2.2.4 Huey UH-1H

The Huey UH-1H helicopter (N535NA), shown in Figure 1-16, is an established, turbine-driven, rotary-wing flight platform. The aircraft is primarily a research and aerial photography asset, although it also serves well in airborne surveillance and installation security. The cockpit contains dual flight controls and a minimal avionics suite consisting of VOR and DME. A mount also exists for a handheld Global Positioning System (GPS). No established research pallet position exists in the spacious rear cargo compartment, which is currently configured to carry 11 passengers. Though the cargo compartment is ideal for platform installation, most research applications were historically mounted beneath the aircraft. This configuration is possible due to the aircraft¹s high-skid configuration, allowing an extra 1.7 ft of clearance between the ground and the aircraft underbelly.

Figure 1-16: Huey UH-1H

1.5.2.2.5 LancAir Columbia LC-40

The LancAir Columbia LC-40 (N507NA), shown in Figure 1-17, is an established, reciprocating, single-engine, fixed-wing flight platform. The aircraft is primarily a research asset. The cockpit contains dual flight controls and an adequate avionics suite consisting of VOR/Instrument Landing System (ILS) and a GPS. The rear compartment contains one equipment operator seat and a research equipment position that extends back into the small cargo compartment.

Figure 1-17: LancAir Columbia LC-40

1.5.2.2.6 North American Rockwell OV-10A/G

The OV-10A/G aircraft (N524NA), shown in Figure 1-18, is a former USAF aircraft designed for stable operation and high maneuverability. It is a twin turboprop aircraft, which can be configured with externally-mounted stores or research pods.

Additionally, it has a large internal bay available for equipment installation. The aircraft is configured with tandem seating for a pilot and observer/researcher. The front cockpit contains full flight, engine, and radio operational controls. The rear cockpit contains basic flight controls and limited engine and landing-gear controls. Both cockpits are equipped with ejection seats.

Figure 1-18: North American Rockwell OV-10A/G

2.0 Scope

2.1 Overview

The scope of the AMOS contract is to provide:

1) Aircraft maintenance and operational support.
2) Space flight readiness training.
3) Airborne research and development.
4) Astronaut Office support.

2.2 Support Locations

2.2.1 Johnson Space Center (JSC) Managed Locations

The Contractor shall provide aircraft maintenance and operational support at the following JSC managed locations:[22]

1) Johnson Space Center, at Ellington Field (EFD), Houston, Texas
2) Forward Operating Locations (FOL):[22]
    a. JSC FOL at El Paso (ELP), Texas
    See SOW Subsection 7.8.1.
    b. JSC FOL at Edwards Air Force Base (EDW), California[23]
    See SOW Subsection 7.8.2.
3) Other locations as required within the contiguous United States (CONUS) and outside the contiguous United States (OCONUS).

2.2.2 Langley Research Center (LaRC) Managed Locations

The Contractor shall provide aircraft maintenance and operational support at the following LaRC managed locations:[22]

1) Langley Research Center, Hampton, Virginia[24]
2) Other locations as required within the contiguous United States (CONUS) and outside the contiguous United States (OCONUS).

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[22] *NASA may add or remove other NASA centers or FOLs during the contract period of performance to meet NASA mission demands. Any NASA Center or FOL added following contract award will be included in the cost-reimbursable portion of the contract until an evaluation can be made by both NASA and the Contractor to determine if the addition is suitable for the fixed-price portion of the contract.*

[23] *NASA anticipates that the requirement for the Edwards Air Force Base forward operating location will only be necessary until completion of Boeing 747 Shuttle Carrier operations.*

[24] *See SOW Subsection 2.3 regarding SOW content and NASA Langley Center unique differences.*

2.3 NASA Center Unique Differences

The format of this statement of work (SOW) reflects JSC as the primary customer. Any unique requirements for work at other NASA centers (e.g. NASA Langley Research Center) are included at the end of each SOW section and titled "Center Unique." When included, these Center unique requirements shall take precedence over JSC's requirements at that Center. If Center unique requirements are not included, then the JSC requirements shall apply to the other NASA Center(s).

2.4 NASA Contact References

Any reference in this statement of work to the following NASA contacts shall also apply to that person's duly appointed designee:

1) NASA Contracting Officer Technical Representative (COTR)
2) NASA Engineering Branch Chief
3) NASA Maintenance Manager

3.0 References and Applicable Documents

3.1 General

3.2 Order of Precedence

In the event of a conflict between a NASA document cited in this statement of work and a non-NASA document cited herein, the NASA document shall take precedence.

3.3 Acronyms

See Appendix A.

3.4 Definitions

See Appendix B.

3.5 Applicable Documents

See Appendix C.[25]

[25] *All applicable documents cited in this SOW shall be the latest active revision at time of issuance of Request for Proposal. For applicable documents referenced in this statement of work with no revision, refer to SOW Appendix C for the applicable document revision.*

3.6 Changes to Applicable Documents

The Contractor shall:

1) Perform work in accordance with the applicable documents referenced in this statement of work.
2) Ensure any reference to an applicable document includes all of its supplements, amendments, and revisions.
3) Ensure that work is performed in accordance with the most recent version of an applicable document. Supplements, amendments, or revisions may be issued during the life of the contract.
4) Immediately implement those changes to applicable documents that result in no change to the the contract.
5) Submit a proposal to the CO and obtain approval from the CO prior to implementing any supplement, amendment, or revision to an applicable document that will result in a change to the fixed-price portion of the contract.
6) Prepare the proposal under the fixed-price portion of the contract.
7) Submit the proposals within thirty (30) calendar days from the date the Contractor receives notification of the supplement, amendment, or revision giving rise to an increase in price of performance.

The CO may direct the Contractor to immediately implement the change even if there is a price impact. However, the Contractor will still be entitled to submit a proposal for equitable adjustment associated with the change.

4.0 Contract Management

4.1 General Requirements

4.1.1 Overview

Category: General

The Contractor shall retain full responsibility for the performance requirements set forth in this contract. The Contractor shall:

1) Perform in accordance with:
    a. NPR 7900.3, *Aircraft Operations Management*
    b. NPD 7900.4, *NASA Aircraft Operations Management*
2) Ensure all work is performed in accordance with approved technical data. See SOW Subsection 1.4.

4.1.2 Normal Hours of Operation

Category: General

The Contractor shall establish operating hours consistent with meeting the mission at each contract location. The Contractor shall also provide personnel for varied work schedules to meet changing mission requirements.

4.1.2.1 JSC Ellington Field

Typical hours of operation for JSC Ellington Field are:

2:30 PM to 11:45 PM (local time)	Sun
6:30 AM to 11:45 PM (local time)	Mon – Thu
6:30 AM to 3:15 PM (local time)	Fri

4.1.2.2 El Paso FOL

Typical hours of operation for the El Paso FOL are:

6:15 AM to 5:00 PM (local time)	Mon – Thu

4.1.2.3 Edwards FOL

Typical hours of operation for the Edwards FOL are:

7:00 AM to 4:00 PM (local time)	Mon – Fri

4.1.3 Facilities

Category: General

The Contractor shall use the NASA facilities listed in Table 1-2, Table 1-3, and Table 1-4.[26, 27]

4.1.4 Deliverables – Management

Category: FP

The Contractor shall provide the management deliverables listed in Table 4-1.

Table 4-1: Data Requirement Description - Management[28]

Data Requirement List (DRL) Item No.	DRD Title
DRD-M01	Management Plan
DRD-M02	Commercial Monthly Purchase Expenditures
DRD-M03	Contractor Work Breakdown Structure and Dictionary
DRD-M04	Lessons Learned Program Plan and Lessons Learned
DRD-M05	Monthly Progress Reports
DRD-M06	NASA Contractor Financial Management Data
DRD-M07	Notification of Potential Labor Dispute and Contingency Strike Plan
DRD-M08	Roster of Contract Personnel
DRD-M09	Small Business Subcontracting Plan Reports
DRD-M10	Salary and Fringe Benefit Data
DRD-M11	Reprocurement Data Package
DRD-M12	Training and Certification Plan
DRD-M13	Environmental and Energy Consuming Product Compliance Reports
DRD-M14	Phase-In and Phase-Out Plan

[26] *See Section TBD, Subsection TBD for a list of installation accountable Government property.*
[27] *The Contractor shall ensure an explosive facility license (AF 2047) is posted in all facilities storing or handling explosives in accordance with AFMAN 91-201, Explosive Safety Standards. The licensing shall be coordinated with the NASA designated representatives.*
[28] *Refer to Section TBD, Appendix TBD for DRD requirements.*

4.1.5 Performance Goals

Category: General

The Contractor performance metrics are outlined in Appendix E, *Performance Goals.*

4.1.6 Process Control, Corrective Actions, and Continual Improvement

Category: FP

The Contractor shall implement process control, corrective actions, and continual improvement in accordance with the following:

1) JPR 1281.9 *JSC Procedural Requirement, Process Control*
2) JPR 1281.14 *JSC Procedural Requirement, Corrective and Preventive Actions, and Continual Improvement*
3) AS-9110 *Aerospace Standard, Quality Maintenance Systems – Aerospace – Requirements for Maintenance Organization, Section 8.5*

4.1.7 Contractor Information Program

Category: FP

The Contractor shall establish, maintain, and utilize a program to disseminate information to all personnel concerning issues of health, environmental, safety practices, and aircraft safety of flight items. Example items include:

1) Documentation of all items disseminated to Contractor personnel.
2) Records showing all personnel are aware of the documentation.

4.1.8 Customer Focus

Category: General

Contractor personnel will be required to interact with NASA personnel and other NASA customers including Government agencies and commercial entities. The Contractor shall ensure all personnel act in accordance with NW-2008-01-001-JSC, *JSC Expected Behaviors*.

4.2 Executive Manager

4.2.1 Overview

Category: FP

The Contractor shall provide a full-time Executive Manager located at Ellington Field to oversee all work performed in this statement of work. The Contractor shall provide an alternate Executive Manager if the primary is unavailable for duty. The Executive Manager or alternate shall:

1) Serve as the single-point-of-contact for all AMOS contract activities.
2) Have full authority to act for the Contractor on all matters relating to this contract.
3) Respond to NASA CO and COTR requests within the specified period established at time of request.

4.2.2 Availability

Category: FP

The Contractor's Executive Manager or alternate shall be available during normal JSC hours of operation (see SOW Subsection 4.1.2) within one (1) hour to meet at Ellington Field with NASA personnel. After normal JSC hours of operation, the Executive Manager or alternate shall be available within two (2) hours after being contacted by NASA to meet at Ellington Field.

4.3 Management Team

Category: FP

The Contractor shall provide a management team to ensure all work is performed in accordance with this SOW.

4.4 Administrative Support

Category: FP

The Contractor shall provide the necessary administrative support services to perform the requirements in SOW Subsections 1.0 through 4.0 and 6.0 through 11.0.

4.5 Management and Planning Reports

Category: FP

The Contractor shall provide general management, planning, budgeting, Data Requirements Descriptions (DRDs), and other reports specified in the fixed-price portion of the statement of work.

4.6 Meetings

4.6.1 Required Meetings

Category: FP

The Contractor shall support the following required meetings. The Contractor shall come to all meetings prepared to discuss activities or present data related to the contract, airfield activities, missions, or other programs. For those meetings marked "Contractor presented," the Contractor shall prepare the agenda (with input from NASA), invite attendees, present the meeting, prepare meeting minutes, and track all action items generated during the meeting.

Management

1) Division status meetings (weekly).
2) Contract evaluation meetings (periodic).
3) Configuration Control Panel meetings (periodic – Contractor presented).[29]
4) All-hands meetings (periodic).

Maintenance

1) Daily aircraft status meetings in accordance with AOD 34100, *Maintenance Manual* (daily – Contractor presented).
2) Aircraft in-phase/major aircraft inspection briefing in accordance with AOD 34100, *Maintenance Manual* (weekly – Contractor presented).
3) Pre-dock and post-dock meetings in accordance with AOD 34100, *Maintenance Manual* (periodic – Contractor presented).

Safety

1) Aviation safety meetings (periodic).

[29] NASA will also present at this meeting as required. The Contractor shall work with NASA to coordinate the meeting agenda.

4.6.2 Other Meetings

4.6.2.1 Fixed-Price Contract Elements

Category: FP

The Contractor shall support meetings dealing primarily with fixed-price contract elements under the fixed-price portion of the contract. The Contractor shall come to all meetings prepared to discuss activities or present data related to the contract, airfield activities, missions, or other programs.

4.6.2.2 Cost-Reimbursable Contract Elements[30]

Category: Cost

The Contractor shall support meetings dealing primarily with cost-reimbursable contract elements under the cost-reimbursable portion of the contract. . The Contractor shall come to all meetings prepared to discuss activities or present data related to the contract, airfield activities, missions, or other programs.

4.7 Financial Management

Category: FP

The Contractor shall provide financial management services (e.g. accounting and budgeting) in support of the contract.

[30] *The "cost" category for meeting support shall not apply to Contractor personnel listed in SOW Subsections 4.2 and 4.3.*

4.8 Human Resources

4.8.1 Workforce

4.8.1.1 General

Category: FP

The Contractor shall provide human resources services to ensure a qualified Contractor workforce is provided to support this SOW.[31] The Contractor shall:

1) Provide fully trained, qualified, and certified (if required) Contractor personnel in sufficient numbers to manage, supervise, and perform work under this contract. The Contractor's workforce shall meet the personnel requirements listed in Appendix D.
2) Ensure no mission impacts due to position vacancies or personnel qualifications. The Contractor shall preclude staffing that may introduce single point failures.
3) Provide personnel with security clearances up to TOP SECRET/SENSITIVE COMPARTMENTED INFORMATION (SCI) based on specific program requirements. NASA will sponsor SCI clearances.

[31] *NASA may restrict the access of any employee, or prospective employee, identified as a potential threat to the health, safety, security, or operational mission of the installation and its personnel.*

4.8.1.2 Surge Requirements

Category: FP/Cost

The Contractor shall support surge demands in staffing or workloads dictated by missions, operations, or maintenance demands. Examples include:

1) Adding multiple shifts
2) Adjusting shifts
3) Part time/temporary personnel

4.8.1.3 Personal Attire and Appearance

Category: General

The Contractor shall ensure that the workforce meets the following personal attire and appearance requirements:

1) Contractor personnel shall not wear jewelry or other forms of attire that, if lost, could constitute a Foreign Object Debris (FOD) or safety hazard, shall not be worn in and around aircraft or aircraft related equipment.
2) Contractor personnel shall wear NASA identification badges except when in the vicinity of aircraft or around mechanical equipment where they could be considered a safety or FOD hazard.
3) Technicians and first line maintenance supervisors shall be easily identified as a Contractor employee. They shall wear uniforms that incorporate a corporate name or logo and clearly depict the employee's first and last name.
4) Office personnel shall wear the appropriate attire conducive to the services being provided to NASA.

4.8.2 Physicals

Category: FP

The Contractor shall ensure personnel obtain Government provided physical examinations and physiological training in accordance with JPR 1700.1, *JSC Safety and Health Handbook*, NPR 7900.3, *Aircraft Operations Management*, and other applicable regulations governing the work task.

4.8.3 Training

4.8.3.1 Training – Safety and Health

Category: FP

The Contractor shall provide safety and health training to meet the requirements in NASA JPR 1700.1 and DRD requirements listed in Table 4-1 for all employees based on job assignment within ninety (90) calendar days of employment and anytime an employee is reassigned to new tasks that require additional safety training.

4.8.3.2 Training – Critical Task

Category: FP

The Contractor shall provide the following training identified by NASA as critical task training to Contractor and NASA identified personnel. Personnel trained to accomplish critical tasks shall be recertified on an annual basis or as stipulated in applicable DoD, NASA, and OEM documents:[32]

1) T-38 and WB-57 ejection seats and seat kits (certified via Contractor certification plan based on approved technical data).
2) T-38 and WB-57 canopy rigging (contractor certified based on approved technical data) .
3) Engine run certifications by type, model, series engine, both low power and high power (contractor certified based on approved technical data with certified personnel approved by NASA).
4) Engine test cell operator (contractor certified based on approved technical data).
5) Auxiliary Power Unit (APU) engine run (contractor certified based on approved technical data).
6) Brake rider (contractor certified based on approved technical data).
7) Weight and balance quality assurance inspector(s), to include use of the automated weight and balance system (AWBS) (certified via formal Government approved classroom training).
8) Explosive handling/storage/shipment. Training shall include a review of responsibilities as defined in NASA JPD 4500.1, *Pyrotechnics – Logistics Management*. (trained and certified in accordance with NASA-STD-8719.12, *Safety Standard for Explosives, Propellants, and Pyrotechnics*).
9) Engine flexible borescope inspection (contractor certified based on approved technical data)
10) Non-destructive inspection procedures (shall maintain a minimum of two (2) level 3 qualified NDI technicians (certified and qualified in accordance with NAS 410, *NAS Certification and Qualification of Non-Destructive Test Personnel*).
11) Parachute repack (certified in accordance with DoD or FAA requirements)
12) Emergency response team training for each type aircraft listed in this SOW (contractor certified based on approved technical data).

[32] *In the event of a conflict between recertification training frequencies cited in this statement of work and those stipulated in other documents, the more frequent recertification training requirement shall apply.*

4.8.3.3 Training – Specialty

4.8.3.3.1 Motor Vehicle Training

Category: FP

The Contractor shall provide personnel to attend training for those who operate motor vehicles operated on the flight-line, hangars, and other JSC property. Examples include:

1) Ensure personnel requiring driving access to the flight line ramp, vehicle service road or taxi-lane Juliet at EFD obtain a City of Houston Airport Red Badge. Red badges will be obtained after successfully completing the Houston Airport System Vehicle Access and Operating Requirements Training contained in the Houston Airport System Operating Instruction 95-03. Once trained by the City of Houston Airport Authority, this training will be repeated on a twelve (12) month recurring basis. The Government or the City of Houston Airport Authority can limit the number of personnel requiring access to these areas.
2) Ensure Contractor personnel operating a vehicle on JSC Property are trained and familiar with the rules and regulations contained in JPR 1600.3, *JSC Traffic Regulations*. The Government reserves the right to suspend an employee from operating vehicles on Government property due to recklessness or failure to comply with referenced JPR rules and regulations.

4.8.3.3.2 Tire and Wheel Maintenance Safety Training

Category: FP

The Contractor shall provide tire and wheel maintenance safety training to all Contractor personnel maintaining tires and wheels for both aircraft and support equipment. Training includes on-equipment, removal, replacement and servicing procedures for flight-line personnel, as well as build-up and tear down procedures for back-shop (intermediate maintenance) personnel. Examples include:

1) Familiarization with the processes and procedures contained in approved technical data for tire and wheel maintenance as it applies to each type/model/series aircraft and support equipment (as applicable) assigned to AOD.
2) Operation of nitrogen and high pressure air servicing equipment.
3) Use and handling of aircraft and support equipment tire remote inflation equipment.
4) Packaging, shipping, and receiving of tire and wheel assemblies.
5) Calibration cycles and requirements for tire and wheel servicing equipment.
6) Multi-piece rim wheel training in accordance with Code of Federal Regulations (CFR) 29 CFR 1910.177.

4.8.3.3.3 Egress Familiarization Training

Category: FP

The Contractor shall:

1) Develop an ejection seat equipped aircraft training syllabus for egress system familiarization.
2) Provide Contractor and Government personnel who access aircraft cockpits with egress system initial and refresher familiarization training.
    a. Initial training must be received prior to accessing cockpits.
    b. Maintain a master list of personnel obtaining the Egress/Cockpit Familiarization initial and refresher training.
    c. Schedule Contractor and Government personnel for refresher training every twenty-four (24) months. Individuals overdue on annual egress familiarization training shall not access aircraft cockpits until they complete the familiarization training.

4.8.3.3.4 Aircraft Ground Handling and Servicing Training

Category: FP

The Contractor shall provide aircraft ground handling and servicing training for Contractor personnel in accordance with approved technical data for the aircraft listed in Table 1-5. Examples include:

1) Towing
2) Parking
3) Mooring
4) Jacking
5) Hoisting
6) Engine ground operations
7) Servicing/de-servicing fuel, oil, hydraulics, oxygen, tire pressure
8) Lubrication

4.8.3.3.5 Support Equipment Training

Category: FP

The Contractor shall provide support equipment training to ensure qualified Contractor operators. Training shall include documentation requirements supporting the need for and use of Air Force Technical Order (AFTO) Form 244, *Industrial/Support Equipment Record*.

4.8.3.3.6 Water Survival Training

4.8.3.3.6.1 All Aircraft

Category: FP

The Contractor shall provide water survival training, The Contractor shall:

1) Train NASA and Contractor aircrew personnel (includes astronauts, staff pilots, and mission crew members).
2) Provide a training class every three (3) months for approximately five (5) aircrew members per class.
3) Obtain NASA approval for pool selection.
4) Review, update, and maintain AOD Form 257, *Water Survival Training* and AOD Form 258, *WB-57 Water Survival Training* curriculum.

4.8.3.3.6.2 Pressure Suit

Category: Cost

The Contractor shall provide pressure suit water survival training to NASA and Contractor aircrew personnel (includes astronauts, staff pilots, and mission crew members) utilizing AOD Form 258, *WB-57 Water Survival Training* curriculum.

4.8.3.3.7 Mishap Investigation Training

Category: FP

The Contractor shall ensure all Contractor personnel assigned to investigate a mishap or high-visibility close call, at a minimum, have completed the "Introduction to Mishap Investigation" course available through System for Administration, Training and Educational Resources for NASA (SATERN) as required by JWI 1040.27A, *JSC Emergency Preparedness Plan, Appendix 5 – JSC Aircraft Mishap Plan* within the last year.

4.8.3.3.8 Engineering Data Management System Training

Category: FP

The Contractor shall provide training for all civil service and contract employees that require access to the Government provided engineering data management (EDM) system described in SOW Subsection 4.11.3.3.

4.8.3.3.9 Hangar Door Operation

Category: FP

The Contractor shall provide hangar door operation training to Contractor personnel in accordance with the following manufacturer's instructions:

1) Hangar E276 and Hangar E135
   Industrial Door Contractors Inc., *Operations and Maintenance Manual*
2) Hangar E990
   Hampshire Construction & Associates, *E-990 Operation & Maintenance Basic Manual*

4.8.3.3.10 Government Industry Data Exchange Program Training

Category: FP

The Contractor shall provide personnel trained in Government industry data exchange program (GIDEP) and the Federal Aviation Administration (FAA) suspected unapproved parts (SUP) program and shall coordinate all such actions with the NASA AOD GIDEP and FAA SUP representative assigned to the Aircraft Quality Assurance Branch.

4.8.3.3.11 Welders

The Contractor shall ensure all welders are trained and qualified in accordance with AWS D17.1, *Specification for Fusion Welding for Aerospace Applications.*

4.8.3.4 Training – Additional

Category: Cost

The Contractor shall develop training materials and provide additional training classes per NASA CO or COTR request.

4.8.3.5 Training – Government Provided

Category: Cost

NASA will provide job specific training classes. The Contractor shall provide personnel to attend these classes. The Contractor shall provide NASA with a list of proposed attendees to attend the classes below. The Government will approve the attendees prior to training.[33] Government provided training will include:

1) NASA Aircraft Management Information System (NAMIS) user's and database administrator training
2) Computer security training in accordance with the Office of Management and Budget Circular A-130, Appendix III, *Security of Federal Automated Information Resources* within three (3) months of employment and annually thereafter
3) Electrostatic discharge training in accordance with NASA JPR 8730.1, *Electrostatic Discharge Control Requirements for the Protection of Electronic Components and Assemblies*.
4) Soldered electrical connections training in accordance with NASA-STD-8739.3, *Soldered Electrical Connections*
5) Crimping and wire harness training in accordance with NASA-STD-8739.4, *Crimping, Interconnecting, Cables, Harnesses, and Wiring*
6) WB-57 pressure suit training
7) Taxi authorization for G-III
8) Aircrew emergency egress
9) Aircrew training specific to NASA aircraft or unique on-board systems for:
    a. Pilots
    b. Flight Engineers
    c. Load Masters
    d. Sensor Equipment Operators
10) Other classes as required

[33] *Class size or job requirements may restrict or limit the number of approved attendees.*

4.8.4 Conferences

Category: General

The Contractor shall:

1) Attend conferences per Government request, or;
2) Receive concurrence from the COTR and approval from the NASA CO prior to attending any Contractor requested conferences.

4.9 Travel

4.9.1 General

Category: Cost

The Contractor shall provide travel arrangement services for Contractor and civil servant personnel.

The Contractor shall:

1) Travel predominantly using commercial air unless requested by NASA to travel using Government air or other conventional modes.
2) Travel during normal duty hours to prevent excessive overtime unless approved otherwise by NASA.
3) Provide services in accordance with Joint Travel Regulations or Federal Travel Regulations as applicable.

4.9.2 Deployments[34]

Category: Cost[35]

The Contractor shall provide personnel at deployed aircraft locations both within the contiguous United States (CONUS) and outside the contiguous United States (OCONUS). The Contractor shall:

1) Coordinate with and receive NASA management approval to determine which technical disciplines and staffing levels will be required to support each deployment.
2) Ensure all support personnel have security clearances, if required, by NASA based on mission.
3) Ensure personnel meet all health, passport, VISA, air carrier, and security requirements when travelling.
4) Identify deployment personnel at least sixty (60) days in advance of OCONUS deployments in order to support Visa application and synchronized pre-deployment and operational tracker (SPOT) enrollment. NASA may require more than sixty (60) days notice for deployment to some locations.
5) Provide medical insurance including medical evacuation insurance for OCONUS deployed personnel.

4.9.3 SPOT, Passports, and Visas

Category: FP

The Contractor shall ensure that all personnel supporting OCONUS deployments posses passports, obtain visas, and participate in the SPOT letter of authorization (LOA) system under NASA sponsorship when required.

4.10 Configuration Control

4.10.1 Configuration Management

Category: FP/Cost

The Contractor shall provide and support configuration management of all aircraft and support equipment. The Contractor shall:

1) Maintain the configuration of all NASA aircraft and support equipment in accordance with all approved drawings, specifications, and other data.
2) Maintain configuration for type certificated aircraft.[36]

[34] *See SOW Appendix B for definition of "deployment."*
[35] *The "Cost" category assignment for deployed personnel shall override any other category assignment in this SOW while employees are off-station at the deployed location.*
[36] *This would include any supplemental type certificates and field-approved alterations incorporated into the aircraft by NASA approved authorities.*

4.10.2 Configuration Tracking

Category: FP

The Contractor shall use the configuration module in NAMIS to track open and completed configuration items issued against all aircraft, engines, support equipment, and other ancillary equipment. All configuration items completed on these NASA assets shall be documented on NASA Form 1671A, *Aircraft Maintenance Packet.*

4.10.3 Configuration Control Panel (CCP)

Category: FP/Cost

The Contractor shall:

1) Support NASA configuration control in accordance with AOD 33839, *Aircraft Configuration Control.*
2) Post Configuration Control Panel (CCP) meeting minutes and approved Configuration Control Panel Directives (CCPDs) to a NASA approved database for retrieval by AOD personnel.

4.11 Document and Data Management

4.11.1 NASA Aircraft Management Information System (NAMIS)

Category: General

The Contractor shall:

1) Use the Government provided NASA Aircraft Management Information System (NAMIS)[37] for aircraft operations, maintenance, and logistics support.
2) Use the following NAMIS application modules in accordance with NPR 7900.3, *Aircraft Operations Management Manual*:
    a. Flight Records/Currency
    b. Flight Data Capture
    c. Aircraft Maintenance
    d. Flight Scheduling Application
    e. Aircraft Logistics Spares Inventory
3) Enter a clear precise narrative description of the discrepancy and corrective action. Examples include:
    a. Troubleshooting findings
    b. Test equipment used
    c. Serial number of critical calibrated equipment (e.g. torque wrenches)
    d. Original discrepancy was or was not duplicated
    e. Ultimate repair actions
4) List the technical reference that was utilized for the repair/inspections to correct the reported anomaly. The Contractor shall include the technical order/directive, engineering work order or maintenance manual number, paragraph, figure, and page number as applicable.
5) Enter actual elapsed maintenance times in the time/hours block in NAMIS for each work order.
6) Suggest recommendations for NAMIS process/software improvements.

[37] *NAMIS is an integrated automated database used to capture aircraft operations, maintenance, and logistics information in support of NASA Centers that operate aircraft. NAMIS will track all scheduled inspections (inspections based on calendar, hourly, cycles, or events) and user discrepancies (unscheduled maintenance) "real-time" that are reported against aircraft, aircraft components, equipment, and special tooling.*

4.11.2 NAMIS Database Administrator

Category: FP

The Contractor shall provide a NAMIS database administrator and alternate with expertise on the day-to-day use of the NAMIS system by the end of contract phase-in period.[38]

4.11.3 Records Management

4.11.3.1 General Records

Category: FP

The Contractor shall provide records management services. The Contractor shall:

1) Control documents and data in accordance with JPR 1281.5, *Document and Data Control* and AOD WI *34100, Maintenance Manual.*
2) Manage and retain records in accordance with JPR 1440.3, *JSC Records Management Procedural Requirements*.
3) Maintain records for type-certificated aircraft in accordance with 14 CFR Section 91.417, *Maintenance Records*.
4) Create and maintain a master file of all archived documents not maintained in NAMIS. The master file shall include a list of document titles, revisions, record locations, and archival dates. If records are relocated after initial archiving, the master file shall be updated to reflect the new record location.
5) Provide copies of archived records not maintained in NAMIS within four (4) hours of NASA, internal auditors, or regulatory authority's request.

[38] See SOW Subsection 4.8.3.5 for government provided training for the NAMIS Database Administrator.

4.11.3.2 Engineering Records

Category: Cost

The Contractor shall provide engineering records management services. The Contractor shall:

1) Maintain records for each assigned engineering project in project files stored electronically on the AOD Engineering server.
2) Keep the project files as a historical record for each completed project. The project files shall be organized so that AOD engineers unfamiliar with a project can locate historical data when needed. Examples include:
    a. Task Transmittal – Engineering (TTE) records
    b. Design requirements
    c. Technical correspondence
    d. Meeting minutes
    e. Design data
    f. Engineering calculations
    g. Design review records
    h. Engineering Work Orders (EWOs)
    i. Airworthiness review records
    j. Flight, Test, and Payload Readiness Review records
    k. Fleet Modification Instructions (FMIs)
    l. Material Review Board (MRB) records
    m. Test Procedure Flight Research Project (TPFRP) records
    n. Ground and flight test results

4.11.3.3 Engineering Data Management (EDM)

4.11.3.3.1 General Requirements

Category: FP

The Contractor shall maintain all existing and newly generated computer aided design (CAD) drawings and engineering electronic data under configuration control using the Government provided EDM system.

4.11.3.3.2 EDM System Database Administration

Category: FP

The Contractor shall provide EDM database administration services for the Government provided EDM system by the end of contract phase-in period. The Contractor shall:

1) Provide a primary database administrator with expertise on the day-to-day use of the existing BlueCielo Meridian Enterprise[39] system (e.g. drawing number assignment, check-in and check-out procedures, database permissions, and drawing release). The database administrator shall serve as the single point-of-contact for all EDM day-to-day usage issues.
2) Provide an alternate EDM administrator if the primary is unavailable for duty (e.g. vacation, illness, etc.).
3) Provide support for a NASA EDM system database administrator.

4.11.3.4 Archival Hard Copy Data

Category: FP

The Contractor shall maintain all AOD engineering archival hard copy data under configuration control. This data is comprised of paper/vellum documents and aperture cards. The Contractor shall:

1) Maintain all existing archival documentation. Examples include:
    a. Aircraft aperture cards (over 300,000 cards)
    b. Paper and vellum drawings (over 100,000 drawings)
    c. Drawing change notices
    d. Engineering Work Orders
    e. Fleet Modification Instructions
    f. Engineering reference material
2) Archive new hard copy data.
3) Provide configuration/revision control for changes to hard copy archival data.

[39] *NASA may replace the existing BlueCielo Meridian Enterprise system with a new Government provided engineering database management system during the contract period of performance. If this change does occur, NASA will provide training for the Contractor database administrator on the new system.*

4.11.4 Data Backup

Category: General

The Contractor shall ensure that personnel follow data backup procedures so that no loss of data will occur due to hardware or software anomalies or destruction/damage to facilities.

4.12 Information Technology Systems

Category: General

The Contractor shall:

1) Adhere to NASA policies for the management of information technology (IT) resources.
2) Utilize the Government provided IT systems to accomplish the requirements in this SOW.[40]
3) Adhere to NASA security procedures for the unauthorized use of Government computer systems.

4.13 Facility Management

4.13.1 Facility Manager Alternates

Category: FP

The Contractor shall assign a facility manager alternate to each hangar, building, warehouse, or facility used or occupied by the Contractor to assist NASA facility managers. One facility manager alternate may be responsible for multiple locations. The facility manager shall:

1) Perform facility inspections in accordance with AOD 33877, *Monthly/Quarterly Safety and Health Inspection*.
2) Report discrepancies (particularly those with safety or health implications).
3) Act as a point of contact in the NASA facility manager's absence.
4) Assist the NASA facility manager in maintaining up-to-date emergency action plans for the facility assigned.
5) Participate in educating occupants of assigned buildings on emergency evacuation plans.

[40] *NASA uses Microsoft Office applications for everyday business operations.*

4.14 Management Services

4.14.1 Special Events

Category: Cost

The Contractor shall provide coordination, setup, and teardown support for special events as required. Examples include:

1) AOD all hands meetings
2) AOD awards ceremonies
3) Airshows
4) Public relations events
5) Crew return activities
6) Visitor support

4.14.2 Courier Services

Category: FP

The Contractor shall supply courier services to pickup and deliver documents and packages to and from Ellington Field facilities, the JSC site, and Houston area locations. The Government will not provide General Services Administration (GSA) vehicles for this contract.[41]

4.14.3 Passenger Vehicles

Category: FP

The Contractor shall provide passenger vehicles licensed to operate on public roadways to accomplish the requirements in this SOW. The Government will not provide GSA vehicles for this contract. [41]

[41] *The Government will provide special purpose vehicles such as fuel trucks and the pressure suit van. Refer to Section TBD, Attachment TBD.*

L4.0 Contract Management – LaRC Center Unique

Category: Cost (SOW Subsections L4.1 through L4.14.3)

The requirements listed in SOW Subsections L4.1 through L4.14.3 shall apply to Langley Research Center.

L4.1 General Requirements

L4.1.1 Overview

See SOW Subsection 4.1.1.

L4.1.2 Normal Hours of Operation

The Contractor shall establish operating hours consistent with meeting the mission at each contract location. The Contractor shall also provide personnel for varied work schedules to meet changing mission requirements.

L4.1.2.1 Langley Research Center

Typical hours of operation for Langley Research Center are:

7:00 AM to 3:30 PM (local time)	Mon – Fri

L4.1.3 Facilities

The Contractor shall use the NASA facilities listed in Table 1-6.[42, 43]

[42] *See Section TBD, Subsection TBD for a list of installation accountable Government property.*

[43] *The Contractor shall ensure an explosive facility license (AF 2047) is posted in all facilities storing or handling explosives in accordance with AFMAN 91-201, Explosive Safety Standards. The licensing shall be coordinated with the NASA designated representatives.*

L4.1.4 Deliverables – Management

The Contractor shall provide the management deliverables listed in Table 4-1.

Table 4-2: Data Requirement Description - Management[44]

Data Requirement List (DRL) Item No.	DRD Title
DRD-M01	Commercial Monthly Purchase Expenditures
DRD-M02	Monthly Progress Reports
DRD-M03	NASA Contractor Financial Management Data
DRD-M04	Roster of Contract Personnel
DRD-M05	Phase-In and Phase-Out Plan

L4.1.5 Performance Goals

See SOW Subsection 4.1.5.

L4.1.6 Process Control, Corrective Actions, and Continual Improvement

SOW Subsection 4.1.6 not applicable.

L4.1.7 Contractor Information Program

SOW Subsection 4.1.7 not applicable.

L4.1.8 Customer Focus

See SOW Subsection 4.1.8.

L4.2 Executive Manager

L4.2.1 Overview

The Contractor shall provide a full-time Executive Manager located at LaRC to oversee all work performed in this statement of work. The Contractor shall provide an alternate Executive Manager if the primary is unavailable for duty. The Executive Manager or alternate shall:

1) Serve as the single-point-of-contact for all AMOS contract activities.
2) Have full authority to act for the Contractor on all matters relating to this contract.

[44] *Refer to Section TBD, Appendix TBD for DRD requirements.*

3) Respond to NASA CO and COTR requests within the specified period established at time of request.

L4.2.2 Availability

The Contractor's Executive Manager or alternate shall be available during normal LaRC hours of operation (see SOW Subsection 4.1.2) within one (1) hour to meet with NASA personnel. After normal LaRC hours of operation, the Executive Manager or alternate shall be available within two (2) hours after being contacted by NASA.

L4.3 Management Team

SOW Subsection 4.3 not applicable.

L4.4 Administrative Support

SOW Subsection 4.4 not applicable.

L4.5 Management and Planning Reports

SOW Subsection 4.5 not applicable.

L4.6 Meetings

L4.6.1 Required Meetings

The Contractor shall come to all meetings prepared to discuss activities or present data related to the contract, airfield activities, missions, or other programs.

Maintenance

1) Daily aircraft status meetings in accordance with LaRC policy.
2) Aircraft in-phase/major aircraft inspection briefing in accordance with LaRC policy.
3) Pre-dock and post-dock meetings in accordance with LaRC policy

Safety

1) Aviation safety meetings (periodic).

L4.6.2 Other Meetings

SOW Subsection 4.6.2 not applicable.

L4.6.2.1 Fixed-Price Contract Elements

SOW Subsection 4.6.2.1 not applicable.

L4.6.2.2 Cost-Reimbursable Contract Elements

See SOW Subsection 4.6.2.2 not applicable.

L4.7 Financial Management

SOW Subsection 4.7 not applicable.

L4.8 Human Resources

L4.8.1 Workforce

L4.8.1.1 General

SOW Subsection 4.8.1.1 not applicable.

L4.8.1.2 Surge Requirements

See SOW Subsection 4.8.1.2.

L4.8.1.3 Personal Attire and Appearance

The Contractor shall ensure that the personal attire and appearance of the workforce is conducive to a safe and professional work environment.

L4.8.2 Physicals

The Contractor shall ensure personnel designated as both qualified and non-qualified flight crew obtain Government provided physical examinations in accordance with NPR 7900.3, *Aircraft Operations Management*, and other applicable regulations governing the work task.

L4.8.3 Training

L4.8.3.1 Training – Safety and Health

The Contractor shall provide safety and health training to meet LaRC requirements for all Contractor employees based on job assignment within ninety (90) calendar days of employment and anytime an employee is reassigned to new tasks that require additional safety training.

L4.8.3.2 Training – Critical Task

The Contractor shall provide the following training identified by NASA as critical task training. Personnel trained to accomplish critical tasks shall be recertified on an annual basis or as stipulated in various DoD, NASA, and OEM documents:[45]

1) OV-10 ejection seats and seat kits (certified via Contractor certification plan based on approved technical data).
2) Engine run certifications by type, model, series engine, both low power and high power (contractor certified based on approved technical data with certified personnel approved by NASA).
3) Explosive handling/storage/shipment in accordance with NASA-STD-8719.12, *Safety Standard for Explosives, Propellants, and Pyrotechnics*).
4) Emergency response team training for each type aircraft listed in this SOW (contractor certified based on approved technical data).

L4.8.3.3 Training – Specialty

L4.8.3.3.1 Motor Vehicle Training

SOW Subsection 4.8.3.3.1 not applicable.

L4.8.3.3.2 Tire and Wheel Maintenance Safety Training

SOW Subsection 4.8.3.3.2 not applicable.

L4.8.3.3.3 Egress Familiarization Training

SOW Subsection 4.8.3.3.3 not applicable.

L4.8.3.3.4 Aircraft Ground Handling and Servicing Training

SOW Subsection 4.8.3.3.4 not applicable.

L4.8.3.3.5 Support Equipment Training

SOW Subsection 4.8.3.3.5 not applicable.

L4.8.3.3.6 Water Survival Training

SOW Subsection 4.8.3.3.6 not applicable.

L4.8.3.3.7 Mishap Investigation Training

SOW Subsection 4.8.3.3.7 not applicable.

L4.8.3.3.8 Engineering Data Management System Training

SOW Subsection 4.8.3.3.8 not applicable.

L4.8.3.3.9 Hangar Door Operation

SOW Subsection 4.8.3.3.9 not applicable.

[45] *In the event of a conflict between recertification training frequencies cited in this statement of work and those stipulated in other documents, the more frequent training requirement shall apply.*

L4.8.3.3.10 Government Industry Data Exchange Program Training

SOW Subsection 4.8.3.3.10 not applicable.

L4.8.3.4 Training – Additional

SOW Subsection 4.8.3.4 not applicable.

L4.8.3.5 Training – Government Provided

NASA will provide job specific training classes. The Contractor shall provide NASA with a list of proposed attendees to attend the classes below. The Government will approve the attendees prior to training.[46] Government provided training will include:

1) NASA Aircraft Management Information System (NAMIS) user's and database administrator training
2) Computer security training in accordance with the Office of Management and Budget Circular A-130, Appendix III, *Security of Federal Automated Information Resources* within three (3) months of employment and annually thereafter
3) Electrostatic discharge training
4) Soldered electrical connections training in accordance with NASA-STD-8739.3, *Soldered Electrical Connections*
5) Crimping and wire harness training in accordance with NASA-STD-8739.4, *Crimping, Interconnecting, Cables, Harnesses, and Wiring*
6) Aircrew training specific to NASA aircraft or unique on-board systems for:
    a. Pilots
7) Other classes as required

L4.8.4 Conferences

SOW Subsection 4.8.4 not applicable.

L4.9 Travel

L4.9.1 General

See SOW Subsection 4.9.1.

L4.9.2 Deployments

See SOW Subsection 4.9.2.

L4.9.3 SPOT, Passports, and Visas

See SOW Subsection 4.9.3.

[46] *Class size or job requirements may restrict or limit the number of approved attendees.*

L4.10 Configuration Control

L4.10.1 Configuration Management

SOW Subsection 4.10.1 not applicable.

L4.10.2 Configuration Tracking

See SOW Subsection 4.10.2.

L4.10.3 Configuration Control Panel (CCP)

The Contractor shall support NASA configuration control in accordance with LaRC guidelines and policies.

L4.11 Document and Data Management

L4.11.1 NASA Aircraft Management Information System (NAMIS)

The Contractor shall:

1) Use the Government provided NASA Aircraft Management Information System (NAMIS)[47] for aircraft operations, maintenance, and logistics support.
2) Use the following NAMIS application modules in accordance with NPR 7900.3, *Aircraft Operations Management Manual*:
    a. Flight Records/Currency
    b. Flight Data Capture
    c. Aircraft Maintenance
    d. Aircraft Logistics Spares Inventory
3) Enter a clear precise narrative description of the discrepancy and corrective action. Examples include:
    a. Troubleshooting findings
    b. Test equipment used
    c. Serial number of critical calibrated equipment (e.g. torque wrenches)
    d. Original discrepancy was or was not duplicated
    e. Ultimate repair actions

[47] *NAMIS is an integrated automated database used to capture aircraft operations, maintenance, and logistics information in support of NASA centers that operate aircraft. NAMIS will track all scheduled inspections (inspections based on calendar, hourly, cycles, or events) and user discrepancies (unscheduled maintenance) "real-time" that are reported against aircraft, aircraft components, equipment, and special tooling.*

4) List the technical reference that was utilized for the repair/inspections to correct the reported anomaly. The Contractor shall include the technical order/directive, engineering work order or maintenance manual number, paragraph, figure, and page number as applicable.
5) Enter actual elapsed maintenance times in the time/hours block in NAMIS for each work order.
6) Suggest recommendations for NAMIS process/software improvements.

L4.11.2 NAMIS Database Administrator

SOW Subsection 4.11.2 not applicable.

L4.11.3 Records Management

L4.11.3.1 General Records

SOW Subsection 4.11.3.1 not applicable.

L4.11.3.2 Engineering Records

SOW Subsection 4.11.3.2 not applicable.

L4.11.3.3 Engineering Data Management (EDM) System

L4.11.3.3.1 General Requirements

SOW Subsection 4.11.3.3.1not applicable.

L4.11.3.3.2 EDM System Database Administration

SOW Subsection 4.11.3.3.2 not applicable.

L4.11.3.4 Archival Hard Copy Data

SOW Subsection 4.11.3.4 not applicable.

L4.11.4 Data Backup

SOW Subsection 4.11.4 not applicable.

L4.12 Information Technology Systems

SOW Subsection 4.12 not applicable.

L4.13 Facility Management

L4.13.1 Facility Manager Alternates

SOW Subsection 4.13.1 not applicable.

L4.14 Management Services

L4.14.1 Special Events

SOW Subsection 4.14.1 not applicable.

L4.14.2 Courier Services

SOW Subsection 4.14.2 not applicable.

L4.14.3 Passenger Vehicles

SOW Subsection 4.14.3 not applicable.

5.0 Program and Project Support

5.1 Overview

Category: Cost

The Contractor shall provide program and project support to NASA. Projects may include NASA reimbursable programs, internal development projects, and new business opportunities generated as a result of shifting budgets and mission priorities. Example support services include:

1) Research, development, acquisition, and sustainment efforts across a broad spectrum of functional disciplines in order to effectively assist in the implementation of Government objectives.
2) Development of quick-reaction capabilities (QRC), streamlined acquisition and development processes, advanced concepts and technology demonstrations (ACTD), user concept of operations (CONOPS), technical assessments, and system development that will support near-term and long-term operational requirements for NASA and other Government agencies.

5.2 Project Management

Category: Cost

The Contractor shall provide project management, project control, and schedule support services for NASA projects. Project managers shall be responsible for managing and executing projects with matrix support from other contract elements in this SOW. Project management support includes tasks such as planning, organizing, technical analysis and recommendations, scheduling, and reporting. Example project management tasks include:

1) Task Management and Control: The Contractor shall develop and present to NASA task management plans describing the technical approach, organizational resources, and management controls to meet the cost performance and schedule requirements of NASA aircraft activities and projects.
2) Schedule Monitoring and Control: The Contractor shall develop and present to NASA project schedules. The Contractor shall monitor project progress, and update schedules as required.
3) Cost Monitoring: The Contractor shall provide cost monitoring to support of project and program activities and monitor costs for control and reporting.

5.2.1 Project Risk Management Plans

Category: Cost

The Contractor shall develop and administer risk management plans in support of project activities.

5.2.2 Reports and Briefings

Category: Cost

The Contractor shall develop reports, briefings, briefing materials, presentation packages, informational brochures, photographs, and test/demonstration/feasibility portfolios including draft and final versions.

5.2.3 Funding Plans & Budget Support

Category: Cost

The Contractor shall provide funding plans and budget support for NASA projects. Examples include:

1) Conduct financial studies and research.
2) Compile, analyze, review, and present financial data.
3) Evaluate project funding plans and changes.
4) Perform project budgeting, analysis, and assistance in the preparation and routing of financial documents.

5.3 Support Services

5.3.1 Project Support

Category: Cost

The Contractor shall:

1) Attend project design reviews, technical interchange meetings, user conferences, program status reviews, management and design reviews, flight readiness reviews, and other reviews per NASA request for projects and programs.
2) Present briefings, record and distribute minutes, and complete assigned action items or specific assignments resulting from these meetings.

5.3.2 Data Gathering

Category: Cost

The Contractor shall conduct data gathering and perform site surveys required to support the conduct of technical studies and analyses, exercises and demonstrations, contingencies, quick reaction tasks, and other requirements. The Contractor may be required to attend and monitor operations at both on and off-site locations in order to gather, compile, develop and edit raw print, video, or digital data and summarize documentation depicting the wide range of project or sponsor capabilities into hard copy or multimedia formats.

5.3.3 Acquisition Liaison Support

Category: Cost

The Contractor shall provide acquisition support services for projects. Example tasks include:

1) Review and prepare technical specifications and supporting documentation.
2) Provide liaison support between program/project management and logistics for procurements.

5.3.4 Technical Support

Category: Cost

The Contractor shall provide technical support services for projects. Example tasks include:

1) Support research, development, and production.
2) Research candidate technologies and plan for upgrades and improvements to aircraft, equipment, facilities, processes, and programs. The Contractor shall provide to NASA recommendations with written rationale on methods to better integrate new technologies.
3) Support aircraft and equipment maintenance issues.
4) Support developing systems, subsystems, equipment, and components.
5) Safety analysis.

5.3.5 Administrative Support

Category: Cost

The Contractor shall provide the necessary administrative support services to perform the requirements in SOW Subsection 5.0.

5.4 Aircraft and Payload Integration

Category: Cost

The Contractor shall provide integration support for payloads, sensors, aircraft upgrades, experiments, and instrumentation. Example tasks include:

1) Coordinate user and aircraft availability schedules.
2) Provide existing data on aircraft to potential users of the aircraft.
3) Coordinate and assist in the assembly, checkout, installation, and troubleshooting of payloads and other equipment.
4) Coordinate payload integration requirements and configurations with appropriate customer organizations.
5) Support development and review of payload data packages (PDP) for each new system integration.
6) Support test and evaluation (T&E) and validation and verification (V&V) activities
7) Develop payload integration timelines.
8) Providing payload operations and development guidance to the customer for unique aircraft operating conditions.
9) Participate in sensor operations training and dress rehearsals scenarios as it relates to the NASA aircraft projects.

5.5 Mission Planning and Development

Category: Cost

The Contractor shall provide mission planning and development support services. Example tasks include:

1) Identify aircraft to meet mission needs
2) Recommend sensor suite optimizations/upgrades to enhance mission capabilities
3) Develop tasking, collection, processing, exploitation, and dissemination (TCPED) requirements.
4) Develop mission cost estimates
5) Prepare memorandums of understanding/agreements (MOU/MOA)
6) Prepare project implementation plans (PIP)
7) Prepare mission related documents:
    a. Proposals
    b. Concept of operations (CONOPS)
    c. Aircraft and personnel clearance automated clearance system (APACS)
    d. Letters of authorization (LOA)
    e. Mission partner coordination, etc.

5.6 Mission Coordination, Implementation, and Execution

Category: Cost

The Contractor shall provide mission coordination, implementation, and execution services for CONUS and OCONUS operations. Examples tasks include:

1) Coordinate military airlift requests
2) Identify, provide, and coordinating Liaison Officer activities
3) Provide advance teams for CONUS and OCONUS missions
4) Develop, provide, and execute logistics plans
5) Provide data collection management support
6) Develop mission execution timelines
7) Support the Communications Security custodian as necessary
8) Develop and executing test cards
9) Support specialized equipment maintenance, training, and operations for Special Mission Unit support

L5.0 Program and Project Support – LaRC Center Unique

Category: Cost (SOW Subsections L5.1 through L5.6)

The requirements listed in SOW Subsections L5.1 through L5.6 shall apply to Langley Research Center.

L5.1 Overview

The Contractor shall provide program and project support to NASA. Projects may include NASA reimbursable programs, internal development projects, and new business opportunities generated as a result of shifting budgets and mission priorities. Example support services include:

1) Research, development, acquisition, and sustainment efforts across a broad spectrum of functional disciplines in order to effectively assist in the implementation of Government objectives.

L5.2 Project Management

SOW Subsection 5.2 not applicable.

L5.2.1 Project Risk Management Plans

SOW Subsection 5.2.1 not applicable.

L5.2.2 Reports and Briefings

SOW Subsection 5.2.2 not applicable.

L5.2.3 Funding Plans & Controls

SOW Subsection 5.2.3 not applicable.

L5.3 Support Services

L5.3.1 Project Support

The Contractor shall:

1) Attend project design reviews, technical interchange meetings, user conferences, program status reviews, management and design reviews, flight readiness reviews, and other reviews per NASA request for projects and programs.
2) Present briefings, record and distribute minutes, and complete assigned action items or specific assignments resulting from these meetings.

L5.3.2 Data Gathering

SOW Subsection 5.3.2 not applicable.

L5.3.3 Acquisition Liaison Support

SOW Subsection 5.3.3 not applicable.

L5.3.4 Technical Support

The Contractor shall provide technical support services for projects. Example tasks include:

1) Support research and development.
2) Support aircraft and equipment maintenance issues.
3) Safety analysis.

L5.3.5 Administrative Support

SOW Subsection 5.3.5 not applicable.

L5.4 Aircraft and Payload Integration

The Contractor shall provide integration support for payloads, sensors, aircraft upgrades, experiments, and instrumentation. Example tasks include:

1) Coordinate and assist in the assembly, checkout, installation, and troubleshooting of payloads and other equipment.
2) Support test and evaluation (T&E) and validation and verification (V&V) activities
3) Develop payload integration timelines.

L5.5 Mission Planning and Development

SOW Subsection 5.5 not applicable.

L5.6 Mission Coordination, Implementation, and Execution

SOW Subsection 5.6 not applicable.

6.0 Flight Operations

6.1 Projected Flight Schedule

6.1.1 T-38N

6.1.1.1 Projected Flight Hours

Category: Refer to applicable SOW paragraph for category (FP, FP/Cost, or Cost)

The Contractor shall support the projected T-38N flight hours shown in Table 6-1 below. These flight hours are the estimated total T-38N hours necessary to support the aircraft quantities listed in Table 1-5.

NASA estimates that no more than fifteen percent (15%) of the projected flight hours will occur between the hours of 5:00 PM and 11:00 PM (local time) and that no more than five percent (5%) of the flight hours will occur between the hours of 11:00 PM and 7:00 AM (local time).

Table 6-1: T-38N Projected Flight Hours[48, 49]

T-38N	Base	Option 1	Option 2
Projected Hours	5830	8000	6330

6.1.1.2 Weekly Flight Schedule

Category: Refer to applicable SOW paragraph for category (FP, FP/Cost, or Cost)

The Contractor shall provide the required number of T-38N aircraft per day shown in Table 6-2 at Ellington Field. The Contractor shall also provide the additional spare (sp) aircraft per day shown in Table 6-2.

Table 6-2: T-38N Weekly Flight Schedule[48]

Contract Year	Required Aircraft per Day							Total per Week
	Mon	Tue	Wed	Thu	Fri	Sat[50]	Sun[50]	
Base	5 +1 sp	8 +2 sp	8 +2 sp	8 +2 sp	6 +2 sp	3 +1 sp	3 +1 sp	35-41 + sp
Option 1	4 +1 sp	8 +2 sp	8 +2 sp	8 +2 sp	5 +1 sp	3 +1 sp	3 +1 sp	33-39 + sp
Option 2	4 +1 sp	7 + 2 sp	7 +2 sp	7 + 2 sp	5 + 1 sp	3 + 1 sp	3 + 1 sp	30-36 + sp

[48] *See Section TBD, Subsection TBD for options to increase or decrease the number of required aircraft per day and flight hours per year.*
[49] *One (1) T-38 aircraft will be reserved by NASA as a dedicated project aircraft. The Contractor shall not rely on this aircraft to fulfill the weekly flight schedule.*
[50] *Saturday and Sunday flights will vary based on weekly schedule requirements.*

6.1.1.3 Flight Schedule Conditions

Category: General

For T-38N scheduling purposes the following conditions shall apply:

1) The Contractor shall not release an aircraft for flight with more than four (4) delayed discrepancies, excluding configuration items.
2) Under normal circumstances, no more than two (2) T-38 aircraft will be launched in any thirty (30) minute period. In some special cases such as memorial flyovers or mission support, the Contractor may be required to support more than two (2) T-38 launches in a thirty (30) minute period. See Table 6-3 below for an example daily schedule.
3) A minimum one (1) hour turn-around time applies for consecutive flights of the same aircraft.
4) The number of T-38N cross-country aircraft will be *counted as part of the required aircraft per day total listed in Table 6-2*[51] until the aircraft returns to Ellington Field.
5) For air and ground aborts at locations other than the NASA Centers and Forward Operating Locations listed in SOW Subsection 2.2, the following conditions apply:
    a. The aircraft will be *counted as part of the required aircraft per day total listed in Table 6-2 for no more than three (3) calendar days.*[52, 53] If Contractor trouble*shooting reveals the repair will exceed three (3) calend*ar days, the Contractor may request a wai*ver from the NASA* M*aintenance Manager for an extension. If a*pproved, the aircraft will be counted as part of the aircraft per day total listed in Table 6-2 for the approved extension period.
    b. The Contractor shall notify the NASA Maintenance Manager when the aircraft is returned to flight status, i.e. repairs are completed, the combined preflight and post-flight (CBPO) inspection is completed, and the aircraft is ready for pilot pickup.[54]

[51] *For example, "counted as part of the required aircraft per day total listed in Table 6-2" means the following: In the base contract period, five (5) aircraft are required on Monday at Ellington Field. If two (2) aircraft leave Monday to fly cross-country and return on Thursday, the Contractor will only be required to have six (6) aircraft (8 minus 2) available on Tuesday and Wednesday (plus spares).*
[52] *For example, "counted as part of the required aircraft per day total listed in Table 6-2 for no more than three (3) calendar days" means the following: In the base contract period, five (5) aircraft are required on Monday. If one (1) aircraft breaks while on cross-country on Monday the Contractor will only be required to have seven (7) aircraft (8 minus 1) available on Tuesday through Thursday (plus spares). After Thursday, the Contractor will not be allowed to subtract the aircraft from the required per day total.*
[53] *If the air or ground abort results in a NASA decision to impound the aircraft as a close call or mishap investigation, the aircraft will be impounded in accordance with AOD WI 34100, Maintenance Manual, and the aircraft will be counted as part of the required aircraft per day total listed in Table 6-2.*
[54] *If a NASA pilot is unavailable for aircraft pickup, the aircraft will be counted as part of the required aircraft per day total listed in Table 6-2 until the pilot returns the aircraft to Ellington Field.*

Table 6-3: Example Daily Schedule[55]

Take-Off Time	Landing Time	Flight Type	Tail Number[56]
0800	1000	Mission Specialist + Instructor Pilot 1	1
0800	1000	Local	2
0830	1030	Local	3
0830	1400	Out and back	4
0900	1500	Out and back	5
0900	N/A	Cross country	6
0930	N/A	Cross country	7
0930	N/A	Cross country	8
		Lunch	
1130	1330	Mission Specialist + Instructor Pilot 2	1
1130	1530	Out and back	2
1200	1600	Out and back	3
1500	1700	Mission Specialist + Instructor Pilot 3	1
1530	1730	Local	4
1600	1800	Local	5

6.1.1.4 Flight Operations Support

Category: Refer to applicable SOW paragraph for category (FP, FP/Cost, or Cost)

The Contractor shall provide the following support services for the T-38N:

1) Provide aircraft launch, recovery, and maintenance services Sun (4:00 PM to 11:00 PM), Mon-Thu (7:00 AM to 11:00 PM) and Fri (7:00 AM to 4:00 PM) at Ellington Field (local time).
2) Tow aircraft (plus spares) to and from the Ellington Field fixed base operator (FBO) to meet weekend and holiday flight schedule requirements. The Contractor is not typically required to launch and recover aircraft on weekends prior to 4:00 PM on Sundays or on holidays.
3) Under special circumstances, NASA may request launch and recovery services on weekends. NASA anticipates weekend launch and recovery support will not exceed six (6) weekends per year.

[55] *This example schedule is provided for reference purposes only and will change daily based on NASA mission requirements.*
[56] *Tail numbers shown are for illustrative purposes only – not actual NASA tail numbers.*

6.1.2 WB-57

6.1.2.1 Projected Flight Hours

Category: Refer to applicable SOW paragraph for category (FP, FP/Cost, or Cost)

The Contractor shall support the projected WB-57 flight hours shown in Table 6-4 below. The flight hours shown in Table 6-4 are the estimated total WB-57 hours necessary to support the aircraft quantities listed in Table 1-5.

NASA estimates that approximately thirty-five percent (35%) of the projected flight hours will occur between the hours of 5:00 PM and 11:00 PM (local time) and that approximately twenty percent (20%) of the flight hours will occur between the hours of 11:00 PM and 7:00 AM (local time).

Table 6-4: WB-57 Projected Flight Hours

WB-57	Base	Option 1	Option 2
Projected Hours	1200	2400	1900

6.1.2.2 Flight Operations Support

Category: Refer to applicable SOW paragraph for category (FP, FP/Cost, or Cost)

The Contractor shall provide the following support services for the WB-57:

1) Provide aircraft launch, recovery, maintenance, and payload integration support services as required Mon – Sun at Ellington Field, forward operating location, or any other aircraft destination or deployed location based on flight schedule requirements.
2) Provide support for CONUS and OCONUS deployments. NASA estimates 665 *deployed days*[57] for the base contract period and 1100 deployed days for contract Option 1 and 1100 deployed days for contract Option 2.

[57] *A deployed day is defined as one (1) aircraft on deployment per day.*

6.1.3 Super Guppy Transport

6.1.3.1 Projected Hours

Category: Refer to applicable SOW paragraph for category (FP, FP/Cost, or Cost)

The Contractor shall support the projected Super Guppy Transport flight hours shown in Table 6-5 below. The flight hours shown in Table 6-5 are the estimated total Super Guppy hours necessary to support the aircraft quantities listed in Table 1-5.

NASA estimates that approximately ten percent (10%) of the projected flight hours will occur between the hours of 5:00 PM and 11:00 PM (local time) and that the aircraft will rarely fly between the hours of 11:00 PM and 7:00 AM (local time).

Table 6-5: Super Guppy Transport Projected Flight Hours

Super Guppy	Base	Option 1	Option 2
Projected Hours	260	330	250

6.1.3.2 Flight Operations Support

Refer to applicable SOW paragraph for category (FP, FP/Cost, or Cost)

The Contractor shall provide the following support services for the Super Guppy Transport:

1) Provide aircraft launch, recovery, maintenance, and payload integration support services as required Mon – Sun at Ellington Field, forward operating location, or any other aircraft destination or deployed location based on flight schedule requirements. Contingent on seat availability, contractor personnel may travel on aircraft.

6.1.4 Boeing 747 Shuttle Carrier Aircraft

6.1.4.1 Projected Hours

Refer to applicable SOW paragraph for category (FP, FP/Cost, or Cost)

The Contractor shall support the projected Shuttle Carrier Aircraft flight hours shown in Table 6-6 below. The flight hours shown in Table 6-6 are the estimated total Boeing 747 hours necessary to support the aircraft quantities listed in Table 1-5.

The Government estimates that approximately twenty percent (20%) of the projected flight hours will occur between the hours of 5:00 PM and 11:00 PM (local time) and that the aircraft will rarely fly between the hours of 11:00 PM and 7:00 AM (local time).

Table 6-6: Shuttle Carrier Aircraft Projected Flight Hours

747	Base	Option 1	Option 2
Projected Hours	30	0	0

6.1.4.2 Flight Operations Support

Refer to applicable SOW paragraph for category (FP, FP/Cost, or Cost)

The Contractor shall provide the following support services for the Shuttle Carrier Aircraft:

1) Provide aircraft launch, recovery, maintenance, and payload integration support services as required Mon – Sun at Ellington Field, forward operating location, or any other aircraft destination or deployed location based on flight schedule requirements. Contingent on seat availability, contractor personnel may travel on aircraft.

6.1.5 Boeing DC-9

6.1.5.1 Projected Hours

Refer to applicable SOW paragraph for category (FP, FP/Cost, or Cost)

The Contractor shall support the projected DC-9 flight hours shown in Table 6-7 below. The flight hours shown in Table 6-7 are the estimated total DC-9 hours necessary to support the aircraft quantities listed in Table 1-5.

NASA estimates that approximately ten percent (10%) of the projected flight hours will occur between the hours of 5:00 PM and 11:00 PM (local time) and that the aircraft will rarely fly between the hours of 11:00 PM and 7:00 AM (local time).

Table 6-7: DC-9 Projected Flight Hours

DC-9	Base	Option 1	Option 2
Projected Hours	40	80	60

6.1.5.2 Flight Operations Support

Refer to applicable SOW paragraph for category (FP, FP/Cost, or Cost)

The Contractor shall provide the following support services for the DC-9:

1) Provide aircraft launch, recovery, maintenance, and payload integration support services as required Mon – Sun at Ellington Field, forward operating location, or any other aircraft destination or deployed location based on flight schedule requirements. Contingent on seat availability, contractor personnel may travel on aircraft.

6.1.6 Gulfstream GIII

6.1.6.1 Projected Flight Hours

Refer to applicable SOW paragraph for category (FP, FP/Cost, or Cost)

The Contractor shall support the projected GIII flight hours shown in Table 6-8 below. The flight hours shown in Table 6-8 are the estimated total GIII hours necessary to support the aircraft quantities listed in Table 1-5.

NASA estimates that approximately thirty-five percent (35%) of the projected flight hours will occur between the hours of 5:00 PM and 11:00 PM (local time) and that approximately twenty percent (20%) of the flight hours will occur between the hours of 11:00 PM and 7:00 AM (local time).

Table 6-8: GIII Projected Flight Hours

GIII	Base	Option 1	Option 2
Projected Hours	340	800	630

6.1.6.2 Flight Operations Support

Refer to applicable SOW paragraph for category (FP, FP/Cost, or Cost)

The Contractor shall provide the following support services for the GIII:

1) Provide aircraft launch, recovery, maintenance, and payload integration support services as required Mon – Sun at Ellington Field, forward operating location, or any other aircraft destination or deployed location based on flight schedule requirements. Contingent on seat availability, contractor personnel may travel on aircraft.

6.1.7 Gulfstream STA

6.1.7.1 Projected Flight Hours

Refer to applicable SOW paragraph for category (FP, FP/Cost, or Cost)

The Contractor shall support the projected STA flight hours shown in Table 6-9 below. The flight hours shown in Table 6-9 are the estimated total STA hours necessary to support the aircraft quantities listed in Table 1-5.

NASA estimates that approximately fifteen percent (15%) of the projected flight hours will occur between the hours of 5:00 PM and 11:00 PM (local time) and that the aircraft will rarely fly between the hours of 11:00 PM and 7:00 AM (local time).

Table 6-9: STA Projected Flight Hours

STA	Base	Option 1	Option 2
Projected Hours	70	100	80

6.1.7.2 Flight Operations Support

Refer to applicable SOW paragraph for category (FP, FP/Cost, or Cost)

The Contractor shall provide the following support services for the STA:

1) Provide aircraft launch, recovery, maintenance, and payload integration support services as required Mon – Sun at Ellington Field, forward operating location, or any other aircraft destination or deployed location based on flight schedule requirements. Contingent on seat availability, contractor personnel may travel on aircraft.

6.1.8 Bombardier Global Express XRS

6.1.8.1 Projected Hours

Refer to applicable SOW paragraph for category (FP, FP/Cost, or Cost)

The Contractor shall support the projected Global Express XRS[58] flight hours shown in Table 6-10 below. The flight hours shown in Table 6-10 are the estimated total Global XRS hours necessary to support the aircraft quantities listed in Table 1-5.

NASA estimates that approximately thirty-five percent (35%) of the projected flight hours will occur between the hours of 5:00 PM and 11:00 PM (local time) and that approximately twenty percent (20%) of the flight hours will occur between the hours of 11:00 PM and 7:00 AM (local time).

Table 6-10: Global XRS Projected Flight Hours

Global XRS	Base	Option 1	Option 2
Projected Hours	530	800	630

6.1.8.2 Flight Operations Support

Refer to applicable SOW paragraph for category (FP, FP/Cost, or Cost)

The Contractor shall provide the following support services for the Global XRS:

1) Provide aircraft launch, recovery, maintenance, and payload integration support services as required Mon – Sun at Ellington Field, forward operating location, or any other aircraft destination or deployed location based on flight schedule requirements. Contingent on seat availability, contractor personnel may travel on aircraft.

[58] *Bombardier Global Express XRS aircraft assignment is pending.*

6.1.9 T-38N Simulator

6.1.9.1 Projected Hours

Refer to applicable SOW paragraph for category (FP, FP/Cost, or Cost)

The Contractor shall support the projected T-38 simulator training hours shown in Table 6-11 below. The hours shown in Table 6-11 are the estimated total training hours necessary to support the T-38N simulator listed in SOW Subsection 1.5.1.2.9.

NASA estimates that no simulator training will occur between the hours of 5:00 PM and 7:00 AM (local time).

Table 6-11: T-38N Simulator Training Hours

Simulator	Base	Option 1	Option 2
Projected Hours	1130	1630	1030

6.1.9.2 Simulator Support

Refer to applicable SOW paragraph for category (FP, FP/Cost, or Cost)

The Contractor shall provide a simulator instructor when requested by NASA to support the training schedule.

6.2 Duty Office

6.2.1 Scheduler

Category: Cost

The Contractor shall create and manage a weekly flight schedule for all aircraft operated by AOD. The Contractor shall coordinate the requests generated by NASA managers, flight crews, project engineers, and others associated with flight operations to create an efficient use of aircraft assets.

6.2.2 Operations Duty Officer

Category: Cost

The Contractor shall provide an Operations Duty Officer (ODO). The ODO shall support flight operations by managing the daily flight schedule, answering operational questions, and assisting by radio during in-flight emergencies.

6.3 Flight Crew

6.3.1 General Requirements

Category: Cost

The Contractor shall provide flight crew personnel to operate and support AOD aircraft. Operational requirements will be provided to the Contractor by the NASA CO/COTR. The Contractor shall:

1) Ensure program support (project) aircraft operations are conducted in accordance with JSC/AOD approved operational directives and NPR 7900.3, *Aircraft Operations Management*. Aircraft will normally be operated as public use aircraft for this mission.
2) Conduct training in mission management aircraft on a non-interference basis with mission management operations. NASA will use mission management aircraft for some types of recurrent and other required qualification training.
3) Conduct operations in accordance with 14 CFR Part 91, *General Operating and Flight Rules*, and the AOD 09295, *Volume II, Aircraft Operations and Training Procedures, Research and Mission Support Aircraft* when flying mission management aircraft transporting officially approved passengers in response to Government travel requirements. The Contractor aircrew shall operate NASA Mission Management Aircraft as civil aircraft when carrying passengers.
4) Require aircrew to input aircraft discrepancies into the NAMIS database in accordance with NPR 7900.3, *Aircraft Operations Management Manual* and AOD 34100, *Maintenance Manual.*
5) Report close calls, or complete other flight paperwork as required.

6.3.2 Performance Standards

Category: Cost

The Contractor flight crew shall:

1) Comply with the provisions set forth in NPR 7900.3, *Aircraft Operations Management*, FAA regulations, original equipment manufacturer (OEM), and other applicable directives, regulations, policies, and instructions.
2) Maintain performance standards in accordance with AOD 09295, Volume I, *Aircraft Operations and Training Procedures, T-38 Operating Procedures, and Volume II, Aircraft Operations and Training Procedures, Research and Mission Support Aircraft*. Examples include:
    a. Safety Precautions: Identified in the applicable aircraft technical data.
    b. Airfield Operations
    c. Normal Procedures: Identified in the applicable aircraft technical data.
    d. Emergency Procedures: All applicable boldface emergency procedures demonstrated without reference to the checklist.
    e. Aircraft Systems: The examiner may randomly select any system(s) for the student to demonstrate adequate skill and knowledge.
    f. System Limitations: Demonstrated without reference to the checklist.

6.3.3 Proficiency, Currency, and Certification

Category: Cost

The Contractor shall ensure flight crew personnel maintain proficiency, currency, and annual requirements in accordance with NPR 7900.3, *Aircraft Operations Management*, AOD 09295, Volume I, *Aircraft Operations and Training Procedures, T-38 Operating Procedures, and Volume II, Aircraft Operations and Training Procedures, Research and Mission Support Aircraft*, and other applicable AOD work instructions.

The Contractor shall:

1) Maintain aircrew training records, which shall include: aircrew qualifications, copies of medical and FAA certificates, training status, and experience. The Contractor shall provide copies of these records to NASA Flight Operations.
2) Operate the designated aircraft in compliance with the current editions of the applicable aircraft flight manuals and other official aircraft documents.

The Government will provide training and qualification checks for Contractor aircrew, including required periodic simulator training. A NASA authorized flight surgeon will provide periodic flight physicals for aircrew.

The Government may, with appropriate notification to the Contractor, designate the requirement for contract aircrews to operate different aircraft, or the existing aircraft with configuration changes. The Government will provide additional training when aircraft equipment, configuration, model, or type is

changed. Mixed Contractor and Government aircrew may be required on an occasional basis to perform aircrew training, functional checks, technical evaluations, or mission operations.

6.3.4 Flight Instructors

Category: Cost

The Contractor shall provide flight instructors. Example duties include:

1) Serve as aircrew in accordance with NPR 7900.3, *Aircraft Operations Management*.
2) Perform support ground school instruction in aircraft systems, flight characteristics, checklists, and other subjects related to the aircraft under instruction.
3) Perform preflight, through-flight, and post-flight inspections on NASA aircraft in accordance with the aircraft flight manual or NASA approved flight crew checklists and procedures.
4) Perform aircrew check flights in accordance with the Aircraft Flight Manual and NASA approved flight instructions.
5) Perform normal and emergency procedures in accordance with the Aircraft Flight Manual and NASA approved flight crew checklists.
6) Perform functional check flights or operational checks on aircraft in accordance with AOD 34100, *Maintenance Manual* and applicable aircraft checklists.
7) Perform/support operational readiness reviews on aircraft prior to deployment in accordance with AOD 33872, *Operation Readiness Reviews*.
8) Support FRRs, TRRs, and PRRs per AOD 33840, *Flight Readiness Review, Test Readiness Review, and Payload Readiness Review*.

6.3.5 Pilots

Category: Cost

The Contractor shall provide pilots. Example duties include:

1) Serve as aircrew in accordance with NPR 7900.3, *Aircraft Operations Management*.
2) Perform preflight, through-flight, and post-flight inspections on NASA aircraft in accordance with the aircraft flight manual or NASA approved flight crew checklists and procedures.
3) Perform normal and emergency procedures in accordance with the Aircraft Flight Manual and NASA approved flight crew checklists.
4) Perform functional check flights or operational checks on aircraft in accordance with AOD 34100, *Maintenance Manual*, and applicable aircraft checklists.
5) Perform/support operational readiness reviews on aircraft prior to deployment in accordance with AOD 33872, *Operation Readiness Reviews*.
6) Support FRRs, TRRs, and PRRs per AOD 33840, *Flight Readiness Review, Test Readiness Review, and Payload Readiness Review*.

6.3.6 Ground and Simulator Instructors

Category: Cost

The Contractor shall provide personnel to perform Ground or Simulator Instructor duties.

6.3.7 Flight Engineers

Category: Cost

The Contractor shall provide Flight Engineers. Example duties include:

1) Serve as aircrew in accordance with NPR 7900.3, *Aircraft Operations Management*.
2) Perform preflight, through-flight, and post-flight inspections on NASA aircraft in accordance with the aircraft flight manual or NASA approved flight crew checklists and procedures.
3) Perform normal and emergency procedures in accordance with the Aircraft Flight Manual and NASA approved flight crew checklists.
4) Perform functional check flights or operational checks on aircraft in accordance with AOD 34100, *Maintenance Manual*, and applicable aircraft checklists.
5) Perform/support operational readiness reviews on aircraft prior to deployment in accordance with AOD 33872, *Operation Readiness Reviews*.
6) Review and determine that weight and center of gravity are within limits for flight in accordance with NPR 7900.3, *Aircraft Operations Management* and ensure copy of weight and balance data is carried aboard aircraft.
7) Perform ground engine runs when requested by maintenance personnel. Flight engineers who perform ground engine runs shall be certified in accordance with AOD 09295, Volume I, *Aircraft Operations and Training Procedures, T-38 Operating Procedures, and Volume II, Aircraft Operations and Training Procedures, Research and Mission Support Aircraft.*
8) Assist in trouble-shooting aircraft systems if requested by maintenance personnel.
9) Perform instructor or examiner flight engineer duties, if designated, in accordance with applicable directives.

6.3.8 Sensor Equipment Operators

Category: Cost

The Contractor shall provide Sensor Equipment Operators (SEO) in support of WB-57 flight operations. Example duties include:

1) Serve as aircrew in accordance with NPR 7900.3, *Aircraft Operations Management*.
2) Serve as sensor equipment operator for all onboard payloads and sensors.
3) Perform preflight, through-flight, and post-flight inspections on NASA aircraft in accordance with the aircraft flight manual or NASA approved flight crew checklists and procedures.
4) Perform normal and emergency procedures in accordance with the aircraft flight manual and NASA approved flight crew checklists.
5) Support/perform functional check flights or operational checks on aircraft in accordance with AOD 34100, *Maintenance Manual*, and applicable aircraft checklists.
6) Support operational readiness reviews on aircraft prior to deployment in accordance with AOD 33872, *Operation Readiness Reviews*.
7) Support FRRs, TRRs, and PRRs per AOD 33840, *Flight Readiness Review, Test Readiness Review, and Payload Readiness Review*.
8) Assist in trouble-shooting aircraft systems if requested by maintenance personnel.
9) Support the development of payload data packages (PDP) for payload/system integration.
10) Develop SEO checklists.
11) Develop and execute flight test cards.
12) Participate in sensor operations training and dress rehearsals scenarios as it relates to the WB-57 program.
13) Perform instructor or examiner special equipment operator duties, if designated, in accordance with applicable directives.

6.3.9 Test Directors

Category: Cost

The Contractor shall provide test directors to support NASA aircraft operations. Example duties include:

1) Serve as aircrew in accordance with NPR 7900.3, *Aircraft Operations Management*.
2) Perform normal and emergency procedures in accordance with the aircraft flight manual and NASA approved flight crew checklists and procedures.
3) Provide ground and in-flight support to ensure personnel safety.
4) Provide support to schedule customers for aircraft missions.
5) Serve as a technical interface to obtain answers to customer payload integration questions.
6) Communicate customer mission requirements to NASA technical and aircrew personnel.
7) Support operational readiness reviews on aircraft prior to deployment in accordance with AOD 33872, *Operation Readiness Reviews*.
8) Support Flight Readiness Reviews (FRRs), Test Readiness Reviews (TRRs), and Payload Readiness Reviews (PRRs) per AOD 33840, *Flight Readiness Review, Test Readiness Review, and Payload Readiness Review*.
9) Provide support to install and remove customer payloads from aircraft.
10) Assist in trouble-shooting payload integration issues.
11) Provide in-flight support to manage customer payload activities.

6.3.10 Loadmasters

Category: Cost

The Contractor shall provide loadmasters. Example duties include:

1) Serve as aircrew in accordance with NPR 7900.3, *Aircraft Operations Management*.
2) Support preflight, through-flight, and post-flight inspections on NASA aircraft in accordance with the aircraft flight manual or NASA approved flight crew checklists.
3) Support normal and emergency procedures in accordance with the Aircraft Flight Manual and NASA approved flight crew checklists.
4) Support functional check flights or operational checks on aircraft in accordance with AOD 34100, *Maintenance Manual*, and applicable aircraft checklists.
5) Support operational readiness reviews on aircraft prior to deployment in accordance with AOD 33872, *Operation Readiness Reviews*.
6) Support FRRs, TRRs, and PRRs per AOD 33840, *Flight Readiness Review, Test Readiness Review, and Payload Readiness Review*.
7) Assist in trouble-shooting aircraft systems if requested by maintenance personnel.
8) Support the development of payload data packages (PDP) for payload/system integration.
9) Participate in flight operations training and dress rehearsals scenarios.
10) Perform instructor or examiner loadmaster duties, if designated, in accordance with applicable directives.
11) Perform pre-mission and post-mission planning activities that are required to ensure that all cargo and payloads operations meet all flight safety requirements.

12) Plan, coordinate, and execute transportation of cargo and mission payloads, and associated support equipment to ensure that all cargo and payloads meet required flight schedules and are delivered safely to the required destination.
13) Initiate all pre-mission activities prior to arrival of other mission personnel. Pre-mission activities include cargo load planning, cargo preparation, material handling equipment preparations and positioning, cargo-loading procedures, customer coordination, and cargo aircraft center-of-gravity requirements.
14) Operate the Super Guppy cargo loaders used to support Super Guppy cargo transport operations and other required aircraft loading and offloading equipment.
15) Review and determine that weight and center of gravity are within limits for flight. Provide appropriate weight and balance data to the aircraft pilots and flight engineers for the purpose of computing required takeoff and landing data.
16) Perform post-mission activities which include cargo unloading, materials handling equipment preparation and positioning, and cargo preparation.
17) Maintain all documentation related to Super Guppy missions. The Contractor shall ensure that all files are accurate and complete and can be accessed for future missions. The Contractor shall maintain maintenance files on all mission support equipment. The Contractor shall be required to perform weight and balance calculations.
18) Provide monitoring and maintenance of shipping fixtures and support equipment.
19) Maintain all mission support equipment with associated certification and calibration data. The Contractor shall ensure all mission support equipment certification and calibration is current.
20) Obtain military Special Assignment Airlift Mission (SAAM) aircraft, Commercial Charter transportation services for both cargo and passengers, surface vessel charters, as identified by the COTR to support NASA programs and projects.

6.4 Deployments

Category: Cost

The Contractor shall support aircraft deployments both within the contiguous United States (CONUS) and outside the contiguous United States (OCONUS). The Contractor shall:

1) Provide personnel in appropriate disciplines to support deployed operations.
2) Perform similar tasks at the deployed location as if the personnel were at their home location.
3) Ensure that deployed personnel have all of the resources necessary to perform their work at the deployed location including essential tools, hardware, and safety related equipment.
4) Provide deployment support. Example tasks include:
    a. Perform duties identified in NPR 7900.3, *Aircraft Operations Management*.
    b. Perform preflight, through-flight, and post-flight inspections on NASA aircraft in accordance with the Aircraft Flight Manual or NASA approved flight crew checklists.
    c. Perform normal and emergency procedures in accordance with the Aircraft Flight Manual and NASA approved flight crew checklists.
    d. Support Operational Readiness Reviews on aircraft prior to deployment in accordance with AOD 33872, *Operation Readiness Reviews*.
    e. Provide/augment NASA deployment management support.
    f. Coordinate mission partner assistance when necessary.
    g. Collate various customer needs into a single cohesive data collection plan.
    h. Develop deployment cost estimates.
    i. Develop and maintain mission schedules.
    j. Generating mission briefings.
    k. Support the communications security (COMSEC) custodian as necessary.
    l. Develop/provide/execute logistics plans in support of deployed operations.
    m. Conduct data gathering and perform site surveys required to support the conduct of deployed flight operations.

L6.0 Flight Operations – LaRC Center Unique

Category: Cost (SOW Subsections L6.1 through L6.4)

The requirements listed in SOW Subsections L6.1 through L6.4 shall apply to Langley Research Center.

L6.1 Projected Flight Schedule

L6.1.1 Langley Aircraft

L6.1.1.1 Projected Flight Hours

The Contractor shall support the projected flight hours shown in Table L6-1 below. The flight hours listed in Table L6-1 are the combined total to support the aircraft listed in Table 1-7. The flight hours are dependent upon aircraft inventory and customer requirements.

Table L6-1: LaRC Projected Flight Hours

LaRC	Base	Option 1	Option 2
Projected Hours	470-600	700-900	550-710

L6.1.1.2 Weekly Flight Schedule

The Contractor shall provide the required aircraft based upon the weekly flight schedule provided by LaRC.

L6.1.1.3 Flight Schedule Conditions

SOW Subsection 6.1.1.3 not applicable.

L6.1.1.4 Flight Operations Support

The Contractor shall provide the following support services:

1) Provide aircraft launch, recovery, and maintenance services Mon-Fri (7:00 AM to 3:30 PM) at LaRC (local time).
2) Under special circumstances, NASA may request launch and recovery services on weekends and after hours for local flights, deployments, and night related projects.

L6.1.2 WB-57

L6.1.2.1 Projected Flight Hours

SOW Subsection 6.1.2.1 not applicable.

L6.1.2.2 Flight Operations Support

SOW Subsection 6.1.2.2 not applicable.

L6.1.3 Super Guppy Transport

L6.1.3.1 Projected Hours

SOW Subsection 6.1.3.1 not applicable.

L6.1.3.2 Flight Operations Support

SOW Subsection 6.1.3.2 not applicable.

L6.1.4 Boeing 747 Shuttle Carrier Aircraft

SOW Subsection 6.1.4 not applicable.

L6.1.4.1 Projected Hours

SOW Subsection 6.1.4.1 not applicable.

L6.1.4.2 Flight Operations Support

SOW Subsection 6.1.4.2 not applicable.

L6.1.5 Boeing DC-9

L6.1.5.1 Projected Hours

SOW Subsection 6.1.5.1 not applicable.

L6.1.5.2 Flight Operations Support

SOW Subsection 6.1.5.2 not applicable.

L6.1.6 Gulfstream GIII

L6.1.6.1 Projected Flight Hours

SOW Subsection 6.1.6.1 not applicable.

L6.1.6.2 Flight Operations Support

SOW Subsection 6.1.6.2 not applicable.

L6.1.7 Gulfstream STA

L6.1.7.1 Projected Flight Hours

SOW Subsection 6.1.7.1 not applicable.

L6.1.7.2 Flight Operations Support

SOW Subsection 6.1.7.2 not applicable.

L6.1.8 Bombardier Global Express XRS

L6.1.8.1 Projected Hours

SOW Subsection 6.1.8.1 not applicable.

L6.1.8.2 Flight Operations Support

SOW Subsection 6.1.8.2 not applicable.

L6.1.9 T-38N Simulator

L6.1.9.1 Projected Hours

SOW Subsection 6.1.9.1 not applicable.

L6.1.9.2 Simulator Support

SOW Subsection 6.1.9.2 not applicable.

L6.2 Duty Office

L6.2.1 Scheduler

SOW Subsection 6.2.1 not applicable.

L6.2.2 Operations Duty Officer

SOW Subsection 6.2.2 not applicable.

L6.3 Flight Crew

L6.3.1 General Requirements

The Contractor shall provide flight crew to operate and support LaRC Research Services Directorate (RSD) aircraft. Operational requirements will be provided to the Contractor by the NASA Contracting Officer (CO). The Contractor shall:

1) Ensure program support (project) aircraft operations are conducted in accordance with LaRC/RSD approved operational directives and NPR 7900.3, *Aircraft Operations Management*. Aircraft will normally be operated as public use aircraft for this mission.
2) Require aircrew to input aircraft discrepancies into the NAMIS database.

3) Report close calls, or complete other flight paperwork as required.

L6.3.2 Performance Standards

The Contractor flight crew shall:

1) Comply with the provisions set forth in NPR 7900.3, *Aircraft Operations Management*, FAA regulations, original equipment manufacturer (OEM), and other applicable directives, regulations, policies, and instructions.
2) Maintain performance standards in accordance with LaRC policies and requirements. Examples include:
    a. Safety Precautions: Identified in the applicable aircraft technical data.
    b. Airfield Operations
    c. Normal Procedures: Identified in the applicable aircraft technical data.
    d. Emergency Procedures: All applicable boldface emergency procedures demonstrated without reference to the checklist.
    e. Aircraft Systems: The examiner may randomly select any system(s) for the student to demonstrate adequate skill and knowledge.
    f. System Limitations: Demonstrated without reference to the checklist.

L6.3.3 Proficiency, Currency, and Certification

The Contractor shall ensure flight crew personnel maintain proficiency, currency, and annual requirements in accordance with NPR 7900.3, *Aircraft Operations Management*, LPR 1710.16, *Aviation Operations and Safety Manual*, and other applicable RSD work instructions.

The Contractor shall:

1) Maintain aircrew training records, which shall include: aircrew qualifications, copies of medical and FAA certificates, training status, experience, and provide this information to the Chief Pilot (or designee) upon the request of the Government. The Contractor shall provide copies of these records to NASA Flight Operations.
2) Operate the designated aircraft in compliance with the current editions of the applicable aircraft flight manuals and other official aircraft documents.

The Government will provide training and qualification checks for Contractor aircrew, including required periodic simulator training. A NASA authorized flight surgeon will provide periodic flight physicals for aircrew.

L6.3.4 Flight Instructors

SOW Subsection 6.3.4 not applicable.

L6.3.5 Pilots (Option – 4, See SOW Subsection 12.4.1)

The Contractor shall provide pilots. Example duties include:

1) Serve as aircrew in accordance with NPR 7900.3, *Aircraft Operations Management*.
2) Perform preflight, through-flight, and post-flight inspections on NASA aircraft in accordance with the aircraft flight manual or NASA approved flight crew checklists and procedures.
3) Perform normal and emergency procedures in accordance with the Aircraft Flight Manual and NASA approved flight crew checklists.
4) Perform functional check flights or operational checks on aircraft in accordance with LaRC/RSD policies, and applicable aircraft checklists.
5) Perform operational readiness reviews on aircraft prior to deployment in accordance with RSD policies.
6) Support Flight Readiness Reviews, Test Readiness Reviews, and Payload Readiness Reviews.

L6.3.6 Ground and Simulator Instructors

SOW Subsection 6.3.6 not applicable.

L6.3.7 Flight Engineers

SOW Subsection 6.3.7 not applicable.

L6.3.8 Sensor Equipment Operators

SOW Subsection 6.3.8 not applicable.

L6.3.9 Test Directors

SOW Subsection 6.3.9 not applicable.

L6.3.10 Loadmasters

SOW Subsection 6.3.10 not applicable.

L6.4 Deployments

See SOW Subsection 6.4

The Contractor shall provide deployment support. Example tasks include:

1) Provide personnel in appropriate disciplines to support deployed operations.
2) Perform similar tasks at the deployed location as if the personnel were at their home location.
3) Ensure that deployed personnel have all of the resources necessary to perform their work at the deployed location including essential tools, hardware, and safety related equipment.
4) Provide deployment support. Example tasks include:
    a. Those duties identified in NPR 7900.3, *Aircraft Operations Management*.
    b. Perform preflight, through-flight, and post-flight inspections on NASA aircraft in accordance with the Aircraft Flight Manual or NASA approved flight crew checklists.

c. Perform normal and emergency procedures in accordance with the Aircraft Flight Manual and NASA approved flight crew checklists.
d. Perform Operational Readiness Reviews on aircraft prior to deployment in accordance with LaRC RSD policies and directives.

7.0 Maintenance

7.1 General Requirements

7.1.1 Overview

Category: General

The contract provides for three-tier aircraft maintenance support (organizational, intermediate, and depot level) for NASA aircraft and support equipment (airframes, engines, appliances, and other equipment) operated at locations identified in SOW Subsection 2.2 of this SOW.[59]

7.1.2 Other Aircraft

Category: Cost

The Contractor shall provide aircraft maintenance and support services for other aircraft. Example aircraft may include:

1) Additional training or mission aircraft. The aircraft type, model, and series will be determined at a future date
2) Other U.S. Government/external organization aircraft

7.1.3 Deliverables – Maintenance

Category: FP

The Contractor shall provide the maintenance deliverables listed in Table 7-1.

Table 7-1: Data Requirement Description - Maintenance[60]

Data Requirement List (DRL) Item No.	DRD Title
DRD-N01	Monthly Maintenance Plan
DRD-N02	Support Equipment Inventory

[59] *The Government reserves the right to perform occasional aircraft maintenance on Government owned aircraft, engines, accessories, and other support equipment. The Government will coordinate this type of maintenance activity with the Contractor.*
[60] *Refer to Section TBD, Appendix TBD for DRD requirements.*

7.1.4 Aircraft Maintenance Program

Category: General

The objective of the three-tier maintenance program is to maintain aircraft and equipment while optimizing the use of personnel, facilities, material, and funds to achieve mission success. The Contractor shall:

1) Implement aircraft/equipment maintenance programs in accordance with AOD 34100, *Maintenance Manual* and approved technical data.
2) Ensure aircraft released for flight are serviceable (safe and operable) and properly configured to meet mission requirements.
3) Be responsible for planning, scheduling, forecasting, and execution of the maintenance program.
4) Ensure that planning provides the most effective and efficient use of human capital, facilities, and equipment, while reducing unscheduled maintenance, and allowing for aircraft and equipment to be returned to a flyable/usable condition with the least impact on mission success.

7.1.5 NASA Maintenance Manager

Category: General

The NASA Maintenance Manager is the Government's point of contact for all matters associated with the three-tier maintenance program and oversees the Contractor's overall maintenance effort. The Contractor shall keep the NASA Maintenance Manager informed on aircraft/equipment status as it applies to scheduled and unscheduled maintenance. The NASA Maintenance Manager is not responsible for the scheduling, planning, forecasting or execution of the Contractor's maintenance efforts.

7.1.6 Maintenance Discipline

Category: General

The Contractor shall:

1) Not perform any work on aircraft/equipment without approved technical data.
2) Comply with all technical data to ensure required repairs, inspections, and documentation is completed in a safe and effective manner.
3) Notify NASA of any safety-of-flight anomalies discovered during maintenance activities.
4) Adhere to approved technical data to maintain aircraft and equipment in accordance with SAE AS9110, *Aerospace Standard, Quality Maintenance Systems – Aerospace – Requirements for Maintenance Organization, SOW Subsections 4.2 and 7.5.1.1*.
5) Ensure technical data is in the immediate work area and is open to the appropriate section for quick reference throughout the period of maintenance.
6) Ensure personnel follow all approved technical data to make certain all warnings and cautions are adhered to and, upon completion of the maintenance task, reviewed again to ensure all requirements have been accomplished.

7.1.7 Aircraft Change Directive Compliance

Category: Cost

The Contractor shall comply with all aircraft change directives (ACDs) approved by NASA (e.g. fleet modification instructions, one time inspections, one time replacements, service changes, customer bulletins, engine bulletins, airframe changes received from aircraft or component manufacturers, the FAA or the DoD) on AOD Form 1298.

7.1.8 Aircraft Acceptance and Transfer

Category: Cost

When requested by NASA, the Contractor shall:

1) Perform aircraft and equipment acceptance and transfer actions in accordance with USAF Technical Order (T.O.) 00-20-1, *Aerospace Equipment Maintenance Inspection, Documentation, Policies and Procedures, Chapters 1 and 8* respectively, while continuing to support flying operations.
2) Work with the Government to identify "best candidate" aircraft for continued support of the NASA mission verses retirement. Drawdown and transfer timeline plans will be prepared by NASA and delivered to the Contractor prior to the FY of execution and adjusted as required quarterly.

7.1.9 FAA Part 145 Repair Station Certification

Category: Cost

If requested by NASA, the Contractor shall obtain FAA Part 145 repair station certification.

7.2 Maintenance Programs

7.2.1 Aircraft Logs and Records Program

Category: FP

The Contractor shall maintain aircraft logs and records. The Contractor shall:

1) Establish procedures in accordance with AOD WI 34100; *Maintenance Manual*, to ensure each person signing entries in the aircraft logs, logbooks and making entries on serviceable parts tags are trained and authorized.
2) Maintain AFTO Form 95s for each Department of Defense (DoD) supported aircraft, as a minimum, in accordance with the type/model/series -6 manual. Specific instructions for filling in the AFTO Form 95 are found in USAF T.O. 00-20-1, Chapter 10.
3) Archive all internally approved configuration documents such as Engineering Work Orders (EWOs), Fleet Modification Instructions (FMIs), Test Procedure – Flight Research Project (TP-FRP), One-Time Inspections (OTIs), and One-Time Replacements (OTRs) in NAMIS as part of the completed Aircraft Maintenance Packet, NASA Form 1671A.
4) Archive other documents in NAMIS as requested by the Government.
5) Retain aircraft maintenance records in accordance with NPR 1441.1, *NASA Records Retention Schedules*, Schedule 7, Agency Filing Scheme #7900 (AFS #7900). In addition, on type-certificated aircraft, records shall be maintained in accordance with 14 CFR Section 91.417, *Maintenance Records*.

7.2.2 Product Identification and Traceability Program

Category: FP

The Contractor shall establish and implement a program for inspections to ensure that purchased products meet the specified purchase requirements and that identification of the product by suitable means throughout product realization is established in accordance with SAE AS9110 and JPR 1281.8, *Product Identification and Traceability*.

7.2.2.1 Disposition of Aircraft Parts

Category: FP

The Contractor shall control product identification and traceability of aircraft life-limited parts in compliance with 14 CFR Section 43.10, *Disposition of Life-Limited Aircraft Parts*, and 14 CFR Section 45.16, *Marking of Life Limited Parts*. Example tasks include:

1) Tag Parts
    a. A tag or other record shall be attached to the parts. The tag or record shall include the part number, serial number, and current life status of the part. Each time the part is removed from a type-certificated product, either a new tag or record shall be created, or the existing tag or record shall be updated with the current life status.
2) Control Parts
    a. The parts shall be controlled using NAMIS to substantiate the part number, serial number, and current life status of the part. Each time the part is removed, the record shall be updated with the current life status. Additional methods for product identification and traceability are listed below. Methods shall prevent the installation of the part on an aircraft after it has reached its life limit. Acceptable methods include:
        i. Non-Permanent Marking
            1. The part shall be legibly marked using a non-permanent method showing its current life status. The life status shall be updated each time the part is removed from a product. If the identification mark is removed, another method of tracking shall be used. On certificated aircraft, the mark shall be accomplished in accordance with 14 CFR Section 45.16, *Marking of Life Limited Parts*, in order to maintain the integrity of the part.
        ii. Permanent Marking
            1. Parts shall be legibly marked in accordance with 14 CFR Section 45.16, *Marking of Life Limited Parts*, in order to maintain the integrity of the part.
        iii. Segregation
            1. The part shall be segregated using methods that prevent its installation on a product. These methods shall include at a minimum:
                a. Maintaining a record of the part number, serial number, and current life status.
                b. Ensuring the part is physically stored separately from parts that are currently eligible for installation.

7.2.3 Trend Analysis Program

Category: FP

The Contractor shall conduct trend analysis in accordance with AOD WI 34100, *Maintenance Manual*.

7.2.4 Tool and Equipment Control Program

Category: FP

The Contractor shall:

1) Provide a tool and equipment management control program to prevent and eliminate foreign object damage (FOD) to aircraft, engines, training and support equipment, and to reduce costs through strict accountability, control and security of common hand tools, special tools, test equipment, support equipment, and other assets.
2) Use the requirements contained in AOD WI 34100, *Maintenance Manual* to ensure that effective tool control is practiced and all tools are accounted for during all phases of maintenance. The Contractor is authorized to add additional requirements for each operating location to ensure positive inventory controls and lost tool reporting.

7.2.5 Foreign Object Debris (FOD) Prevention Program

Category: FP

The Contractor shall establish and enforce a foreign object elimination (FOE)/foreign object damage (FOD) program for NASA facilities and operating areas in accordance with AOD WI 34100, *Maintenance Manual*.

7.2.6 Facility Services

Category: FP

The Contractor shall promote a safe and secure work environment in accordance with JPR 1700.1, *JSC Safety and Health Handbook.* In addition to those requirements stipulated in JPR 1700.1, the Contractor's responsibilities shall include:

1) Promote a clean as you go program. The Contractor shall ensure the work area is clean:
    a. Prior to starting an operation
    b. As an operation progresses and work debris accumulates
    c. When an operation cannot continue
    d. After an operation is completed and prior to inspection and work sign-off
    e. At the end of the shift.
2) Maintain a clean and orderly work area. Ensure all necessary tools, materials, and equipment are stored in their proper locations.
3) Ensure foreign object debris cans and containers, trash cans, and other disposal cans are strategically placed throughout the workplace to prevent foreign objects from migrating into aerospace products. These containers shall be clearly marked to avoid co-mingling of various types of debris.
4) Ensure hangar wall areas (within reach) are kept clean. This includes power cable racks, fire hose assemblies, fire cabinets, fire extinguishers and portable eye wash stations. Fire hoses, extinguishers, and eye wash stations shall be clean and serviceable at all times.
5) Maintain hangar floor cleanliness and safety:
    a. Clean hangar floors to ensure free from dirt, grease, and oil. Machine scrub hangar floors once a week minimum to remove built-up dirt, soil or other foreign materials to prevent slip hazards.
    b. Ensure hangar corners and areas under stairwells are cleaned at least once per month.
    c. Remove standing water from interior of hangar or other work areas following foul weather. The Contractor shall display "wet floor" caution signs when cleaning these areas where people are or shall be present before floors are dry.
    d. Hangar spills shall be cleaned up immediately.
    e. Sweep all hangars (to include areas under hangared aircraft) and shop areas and ensure equipment and materials are properly stored at the end of the shift and work day.
6) Ensure hangar doors and drain grates are free of debris.
7) Stow cables in "walk-overs" when in use. Cable and "walk-overs" shall be stowed when not in use to avoid trip hazards.
8) Ensure aircraft positioned in the hangar have drip pans placed under them.
9) Ensure the safe use, handling, storage and disposition of materials, including hazardous materials, used in support of aircraft maintenance and in the support shops. Products and materials such as flammables and combustibles shall be stored in approved flammable materials storage cabinets. Products that are not compatible (when stored together) shall be stored separately. Small quantities (no greater than one (1) day's usage) of flammable and combustible materials may be kept in the shop, hangars and other such work areas where it is safe to do so.

7.2.7 Weight and Balance Program

Category: FP

The Contractor shall ensure a weight and balance program for each aircraft is established and maintained in accordance with AOD WI 34100, *Maintenance Manual*.

7.2.8 Corrosion Prevention and Control Program

Category: FP

The Contractor shall conduct a corrosion prevention and control program in accordance with AOD WI 34100, *Maintenance Manual.*

7.2.9 Fuel Surveillance Program

Category: FP

The Contractor shall conduct a fuel surveillance program in accordance with AOD WI 34100, *Maintenance Manual*.

7.2.10 Hydraulic Contamination and Prevention Program

Category: FP

The Contractor shall conduct a hydraulic contamination prevention program in accordance with AOD WI 34100, *Maintenance Manual.*

7.2.11 Joint Oil Analysis Program (JOAP)

Category: FP

The Contractor shall conduct a JOAP program in accordance with AOD WI 34100, *Maintenance Manual*.

7.2.12 Electrostatic Discharge (ESD) Program

Category: FP

The Contractor shall conduct an ESD Program in accordance with AOD WI 34100, *Maintenance Manual*.

7.2.13 Aviators Breathing Oxygen Surveillance (ABO) Program

Category: FP

The Contractor shall conduct an ABO Program in accordance with AOD WI 34100, *Maintenance Manual*.

7.2.14 Support Equipment (SE) Program

Category: FP

The Contractor shall conduct an SE program for powered, non-powered, and calibrated equipment (metrology) to achieve and maintain maximum material readiness, safety, and conservation of the equipment. The Contractor shall:

1) Ensure that the maintenance (including calibration and repair), inventory control, and reporting of current status is an integral part of maintaining aircraft and various support equipment required to meet mission success.
2) Utilize NAMIS (see SOW Subsection 4.11) to maintain inventory and readiness data for all supported SE and calibration items. This includes scheduled and unscheduled maintenance complied with in accordance with original equipment manufacturer (OEM) technical data, NASA CC-WD-N6, *Aircraft Non-Powered Ground Support Equipment Work Cards* and CC-WD-G5, *Aircraft Powered Ground Support Equipment Work Cards* and all technical data referenced within this SOW.
3) Maintain and inspect the T-38N aircraft support cargo pods and rear seat cargo container in accordance with T.O. 1T-38A-2-2CL-6, *WSSP Removal/Installation and Inspection Procedures Checklist*.
4) Ensure the protection of SE from the elements by using cleaning, corrosion control, preservation methodologies to include support equipment placed in storage.
5) Act as a focal point for all matters involving SE, to include making recommendations to the Government on new/revised SE requirements to support known and new mission requirements.
6) Investigate all lost SE items and provide the Government with information necessary to fully understand the circumstances surrounding the missing equipment.
7) Function as the centralized SE inventory management authority responsible for coordinating redistribution of in-use assets among other users and NASA organizations supported by this SOW.
8) Manage metrology and calibration tools and equipment in accordance with AOD WI 34100, *Maintenance Manual*.

7.2.15 Slings and Lifting Device Program

Category: FP

The Contractor shall establish a sling and lifting device program, to include periodic inspections to comply with the requirements of NASA-STD 8719.9, *Standard for Lifting Devices and Equipment*, USAF Technical Data T.O. 35D6-1-106, *Periodic and Maintenance Instructions –Aircraft and Engine Slings and Restraining Devices*, JPR 1700.1, *JSC Safety and Health Handbook, Chapters 5.8 and 8.5 and* AOD CC-WD-P012, *Aircraft and Engine Slings Inspection Workcards.* All lifting devices shall have an AFTO Form 244, *Industrial/Support Equipment Record*, affixed and maintained by the Contractor.

7.2.15.1 Critical Lifts

Category: FP/Cost

The Contractor shall conduct critical lifts in accordance with JPR 1700.1, *JSC Safety and Health Handbook*, Chapter 8.5, to ensure compliance with all requirements contained in NASA-STD 8719.9, *Standard for Lifting Devices and Equipment.* Example critical lifts include:

1) Lifting G-III engines
2) Lifting DC-9 engines

7.2.15.2 Pre-lift Documentation

Category: FP

The Contractor shall ensure the following documentation has been completed and available prior to any critical lift occurring:

1) JSC Form 941, *Pre-lift Checklist*, in accordance with NASA-STD 8719.9, *Standard for Lifting Devices and Equipment.*
2) An approved job hazard analysis (JHA) for the lift being accomplished.

7.2.15.3 Slings and Rigging Equipment

Category: FP

The Contractor shall ensure slings and rigging equipment to include testing and inspection meet the requirements in NASA-STD 8719.9, *Standard for Lifting Devices and Equipment*.

7.2.15.4 Suspended Load Approval

Category: FP

The Contractor shall ensure personnel are not located under suspended or moving loads unless the operation adheres to the OSHA-approved NASA Alternate Standard for Suspended Load Operations contained in NASA-STD-8719.9, *Standard for Lifting Devices and Equipment*, *Appendix A.*

7.3 Maintenance Control

Category: FP

The Contractor shall establish a maintenance control to serve as the centralized control point for all scheduled and unscheduled maintenance activities. Example tasks include:

1) Plan, schedule, forecast, and execute a sound maintenance program for maintenance identified in SOW Subsection 7.1.4 of this SOW.
2) Staff maintenance control when maintenance, servicing, and flight operations are being conducted.
3) Conduct aircrew debriefs at the termination of each sortie/mission or when a sortie/mission is aborted.

4) Serve as the single-point-of-contact, communicating between the NASA Maintenance Manager, NASA Quality, and NASA Operations Duty Officer on all matters affecting aircraft status, availability, and initial notification of close call and mishap reporting. This includes prompt reporting with justification of estimated time in commission (ETICs) changes after initial notification, changes in established priorities, plans and schedules.
5) Coordinate all aircraft engine runs and all aircraft ground movements conducted by maintenance personnel.
6) Be proficient in the use of the NASA Aircraft Management Information System (NAMIS) automated database (refer to SOW Subsection 4.11.1 of this SOW).
7) Review and approve all NASA Form 1671A, *Aircraft Work Package*, inputs generated in NAMIS.
8) Perform documentation and system reviews using NAMIS prior to generating a NASA Form 1673A, *Flight Preparedness Report*, to certify and release an aircraft for flight.
9) Ensure aircraft that are scheduled for cross-country flights will not have a scheduled maintenance event come due while the aircraft is cross-country.
10) Keep the NASA Aircraft Maintenance Manager informed of intentions to dispatch personnel for aircraft off-station repair actions in accordance with AOD WI 34100, *Maintenance Manual.*
11) Update Flight Scheduling Application (FSA) as changes occur to schedules, aircraft configuration, and aircraft status that impact aircraft flight scheduling activities.
12) Initiate, approve, track, and report all cannibalizations actions, regardless of location, using AOD Form 229, *Cannibalization Authorization* in accordance with AOD WI 34100; *Maintenance Manual*. The Contractor shall not cannibalize any NASA aircraft that is in storage without prior approval of the NASA Maintenance Manager.
13) Adhere to the Functional Check Flight (FCF), Operational Check Flight (OPS Check) program in accordance with AOD WI 34100, *Maintenance Manual*. Ensure all documentation and aircrew briefs required to support this program are fully supported.
14) Conduct pre-dock and de-dock meetings for planned major aircraft inspections and aircraft being inducted into the T-38 depot at El Paso, Texas in accordance with AOD WI 34100, *Maintenance Manual*.
15) Adhere to the notification policy and documentation requirements for reporting aircraft ground, air aborts, and maintenance delays in accordance with AOD WI 34100, *Maintenance Manual.*
16) Support Flight Readiness Reviews and Test Readiness Reviews in accordance with AOD WI 33840 and Operational Readiness Reviews in accordance with AOD WI 33872.
17) Monitor the JSC Internal Home Page for JSC Spaceflight Metrology Group (SMG) weather advisories issued via the JSC Emergency Notification System (JENS) and respond per SOW Subsection 7.3.3.

7.3.1 Aircraft Release Authority

Category: FP

The Contractor shall:

1) Ensure that personnel performing maintenance release of aircraft and aircraft components are qualified and certified in accordance with Aerospace Standard, SAE AS9110, 6.2.2f.
2) Provide the CO and COTR with a list of personnel who are trained and authorized to certify an aircraft is "safe for flight." This list shall include those personnel authorized to utilize this authority at satellite maintenance controls (e.g. FOLs) at the NASA locations specified within this SOW.
3) Include processes that will be utilized for personnel authorized to release aircraft for flight at deployed sites away from locations specified within this SOW.

7.3.2 Static Display and Training Aircraft

Category: FP/Cost

The Contractor shall prepare static display and training aircraft in accordance with AOD WI 34100, *Maintenance Manual.*

7.3.3 Lightning/Sudden Severe Weather

Category: FP/Cost

The Contractor shall comply with lightning/sudden severe weather requirements in accordance with AOD WI 34100, *Maintenance Manual.*

7.4 Scheduled and Unscheduled Maintenance

7.4.1 Aircraft Maintenance

Category: FP/Cost

The Contractor shall perform three-tier scheduled and unscheduled aircraft maintenance (organizational, intermediate, and depot level) in accordance with approved technical data.[61]

[61] See SOW *Appendix B for definitions of "scheduled" and "unscheduled" maintenance.*

7.4.2 Aviator's Life Support Systems and Equipment Maintenance

Category: FP/Cost

The Contractor shall perform all scheduled and unscheduled aviator's life support systems (ALSS) and equipment maintenance.[62, 63]

7.4.3 Powered, Non-Powered, and Calibrated Support Equipment

Category: FP/Cost

The Contractor shall perform all scheduled and unscheduled maintenance for powered, non-powered, and calibrated support equipment.[62, 63]

7.4.4 Off-Station Maintenance

Category: FP/Cost

The Contractor shall:

1) Follow the requirements outlined in AOD WI 34100, *Maintenance Manual* for coordinating off-station repair actions.
2) Obtain advance approval to dispatch Contractor personnel from the NASA Maintenance Manager to troubleshoot/repair off-station aircraft.

7.4.5 Flight Line Services

7.4.5.1 Aircraft Ground Handling/Servicing

Category: FP/Cost

The Contractor shall accomplish all ground handling and servicing in accordance with approved technical data. Example tasks include:

1) Towing
2) Parking
3) Mooring
4) Jacking
5) Hoisting
6) Engine ground operations
7) Servicing/de-servicing fuel, oil, hydraulics, oxygen, tire pressure
8) Lubrication

[62] *See Section TBD, Appendix TBD for list of powered, non-powered, and calibrated support equipment.*
[63] *See SOW Subsection 1.4 for definitions of "supported" or "not supported" by approved technical data.*

7.4.5.2 Launch and Recovery

Category: FP/Cost

The Contractor shall:

1) Prepare the aircraft before aircrew arrival, assist the aircrew during flight preparations, and be in place to recover, inspect, and service each aircraft before the next launch in accordance with approved technical data.
2) Meet and park other Government aircraft, to include DoD and NASA transient aircraft during normal maintenance work shift hours.
3) Pre-position fire extinguishers, ladders, chocks, grounding wires, powered and non-powered SE required for aircraft arrival and inspect aircraft parking areas for evidence of foreign objects.

7.4.5.3 Aircraft Ready Times

Category: General

The Contractor shall ensure aircraft are ready for flight to meet the timelines specified in AOD WI 34100, *Maintenance Manual*.

7.5 Production Control

Category: FP

The Contractor shall establish a production control to serve as the centralized control point for all scheduled and unscheduled maintenance activities as they relate to intermediate and depot level (I-D) maintenance conducted at AOD. Examples include:

1) Plan, schedule, forecast, and execute a sound maintenance program.
2) Serve as the single-point-of-contact for overhaul, repair, check, test, certification, modification, or manufacturing processes accomplished in the intermediate and depot level support shops.
3) Ensure priorities for repairs, upgrades, manufacturing, and logistics are set based on requirements to support NASA missions.
4) Be proficient in the use of the NASA Aircraft Management Information System (NAMIS) automated database (refer to SOW Subsection 4.11.1 of this SOW).
5) Review and approve all NASA Form 1671A, *Aircraft Work Package* inputs generated in NAMIS to support intermediate and depot level support shops.
6) Initiate, approve, track, and report all cannibalizations actions using AOD Form 229, *Cannibalization Authorization* in accordance with AOD 34100, *Maintenance Manual*.
7) Conduct assessment of the intermediate and depot level maintenance activities for each month by conducting trend analysis, reviewing cannot duplicate discrepancy rates, reviewing and making recommendations to improve adverse trends and improve overall I-D level turn-around times for component repairs.
8) Maintain direct liaison with the Contractor's Logistics to ensure supply stock levels do not fall below approved levels for items repairable within the back shops.
9) Ensure strict accountability and control of all components/assets and equipment that enter the support shops for repair or other maintenance related function.
10) Maintain an up-to-date CC-GEN-002, *Automatic Beyond Capability of Maintenance (BCM) Listing*, located in the AOD library to readily identify those repairable assets that "are not repairable on station" at AOD. The Contractor shall review the BCM listing every thirty (30) days and submit changes using the AOD Form 21 process in accordance with AOD 34100, *Maintenance Manual* if required.
11) Maintain an up-to-date CC-GEN-001, *Component Repair Listing* (CRL) located in the AOD library to readily identify those repairable assets that "are repairable on station" at AOD. The Contractor shall review the CRL every thirty (30) days and submit changes using the AOD Form 21 process in accordance with AOD 34100, *Maintenance Manual* if required.
12) Coordinate the dispatching of personnel with maintenance control to support on-aircraft maintenance requirements.

7.6 Support Shop Services

7.6.1 General

Category: FP/Cost

The Contractor shall provide support shop services for scheduled and unscheduled maintenance to include the repair, alteration, fabrication, test and check, reclamation, rebuild and overhaul of parts, assemblies, sub-assemblies and end-items in accordance with approved technical data.[64] Example services include:

1) Electrical Systems
2) Communications and Navigation (COM/NAV) Systems
3) Pneudraulics Systems and Components
4) Mechanical Accessories
5) Sheetmetal and Composites
6) Welding
7) Battery
8) Paint and Corrosion Prevention and Treatment
9) Wheel and Tire Assembly/Disassembly
10) Manufacturing
11) Machining
12) Modification of end-items
13) Test and Check Capabilities
14) Inspecting
15) Rework, repair and inspecting powered and non-powered support equipment
16) "I" level calibration of designated equipment

7.6.2 Component Repair Listing

7.6.2.1 T-38/J85 Items

Category: FP

The Contractor shall troubleshoot, check, test, and repair all items marked as T-38/J85 in AOD CC-GEN-001, *Component Repair Listing* in-house under the fixed-price portion of the contract unless otherwise authorized in advance by the NASA Contracting Officer (CO) or designated representative for off-station repair under the cost-reimbursable portion of the contract.

[64] *See Subsection 1.5.1.1for JSC facility listing*.

7.6.2.2 Other Items

Category: Cost

The Contractor shall troubleshoot, check, test, and repair all items other than those marked as T-38/J85 in AOD CC-GEN-001, *Component Repair Listing* under the cost-reimbursable portion of the contract.

7.6.3 Special Equipment and Tooling

Category: FP/Cost

The Contractor shall:

1) Ensure all special equipment and tooling is serviceable.[65]
2) Maintain the equipment in the proper hardware and software configurations to test all assigned assets. If maintenance of equipment is beyond the capability of the Contractor, the Contractor shall contact NASA for additional guidance.

7.6.4 Support Equipment Shop

Category: FP

The Contractor shall maintain a SE shop in accordance with Air Force Occupational Safety and Health Standard 91-20 (AFOSHSTD91-20), *Vehicle Maintenance Shops.*

[65] *See contract Section J, Appendix TBD for list of special equipment and tooling.*

7.6.5 Egress Systems Shop

Category: FP/Cost

The Contractor shall be responsible for maintaining the ejection seats listed in Table 7-2 below:

Table 7-2: Ejection Seats

Type Model Aircraft	Make/Model Ejection Seat
T-38N	Martin Baker MK US16LN-1/-2 and McCormick Selph Canopy Fracturing System
WB-57[66]	Douglas 1C-6

Example responsibilities include:

1) Ensure all egress maintenance, to include removal and installation, inspection, repair, and upgrades shall be accomplished in accordance with Air Force Instruction 21-101 (AFI 21-101), *Aircraft and Equipment Management, Chapter 16* and other egress or OEM specific technical data as applicable.
2) Utilize approved command and response methods when directed by technical data during any task requiring the removal/installation of explosive components, and during egress final inspections.
3) Ensure only trained and qualified egress personnel install and remove parachutes and survival kits that are integral parts of ejection seats.

7.6.5.1 Egress Support Equipment

Category: FP/Cost

The Contractor shall maintain, inspect, repair, and modify all Martin Baker and other egress support equipment to ensure equipment is available to support both scheduled and unscheduled maintenance requirements. The Contractor shall use of AFTO Form 244, *Industrial/Support Equipment Record*, for all support equipment. Examples egress support equipment includes: cranes, cradles, and stands.

7.6.5.2 Aircraft Canopy System

Category: FP/Cost

The Contractor shall:

1) Perform scheduled and unscheduled canopy system maintenance to include canopy rigging, adjustments, and rig checks.
2) Ensure canopy system maintenance is restricted to qualified and trained egress technicians.

[66] *NASA is currently converting to Advanced Concept Ejection Seat (ACES II) seats for the WB-57.*

7.6.5.3 Survival Beacon Activation

Category: FP/Cost

Contractor egress personnel shall locate inadvertent beacon activation on the flight-line in accordance with AFI 11-301, *Aircrew Flight Equipment (AFE) Program, Volume 1* and take appropriate actions. If egress personnel are not available, Contractor life support technicians shall locate inadvertent beacon activations within their shops/vehicles and on the flight-line and take appropriate actions.

7.6.5.4 Explosives

7.6.5.4.1 Egress Work Center Explosive Locker

Category: FP

The Contractor shall ensure that levels of explosives in the work center explosive locker(s) do not exceed that which is authorized on the Explosive Facility License, AF Form 2047. The explosive locker(s) shall be clearly marked in accordance with federal, state and local regulations, to include proper fire symbols for the type of explosive devices stored inside the locker(s) and building(s).

7.6.5.4.2 Storage

Category: FP

The Contractor shall:

1) Ensure all explosive devices and seats are safetied, capped, plugged, and tagged with proper identification when not physically installed in the aircraft.
2) Explosives removed from one seat will not be co-mingled with those from another system.
3) All removed ejection seats shall be clearly marked “armed” or “de-armed” and appropriate seat covers installed at all times while maintenance is not being performed on the seat.

7.6.5.4.3 Transportation

Category: FP

The Contractor shall ship and transport explosives in accordance with Code of Federal Regulations (CFR) 49, *Hazardous Material Regulation* and Air Force Manual 91-201 (AFMAN 91-201), *Explosive Safety Standards*.

7.6.5.4.4 Defects

Category: FP

The Contractor shall notify the NASA Maintenance Manager immediately for guidance if an egress item is found to be defective.

7.6.6 Personal Equipment Shop

Category: FP

The Contractor shall operate the personal equipment shop as delineated in JPD 8021.1, *In-Flight Personal Equipment for JSC Aircraft Operations*. The Contractor shall:

1) Maintain records for each individual requiring flight gear. The Contractor may elect to use the below approved Aircraft Operations Division (AOD) forms, or develop other means, to account for in-flight personal equipment:
    a. AOD Form 922A: *Personal Clothing and Equipment Record – Flight Status Personnel*.
    b. AOD Form 922B: *Personal Clothing and Equipment Record – Non-Flight Status Personnel*.
2) Provide assistance to aircrew to ensure personal flight equipment fits properly.
3) Clean and maintain flight gear in accordance with approved technical data.
4) Fabricate and repair soft goods, both aircraft related and non-aircraft related. Pattern making and sewing skills are required to manufacture items, such as seat cushion covers, flight clothing bags, aircraft intake covers, equipment covers, aircraft forms bags, aircraft interior panel/seat covers, any items per engineering or end user drawings, and applicable technical data.
5) Fabricate labels, signs, and nametags.
6) Maintain, inspect, and replenish first aid kits.
7) Handle, store, and forecast explosive devices utilized to support in-flight clothing and personal equipment.
8) Maintain, inspect and set up night vision goggles in accordance with manufacturer's instructions.
9) Inspect, test, build-up, repair, and assemble smoke masks in accordance with approved technical data.
10) Maintain flight crew oxygen masks in accordance with approved technical data.
11) Maintain storage noted below:
    a. Bonded Storage Area
        i. Maintain bonded storage areas for personal parachute assemblies (PPAs) and their components in accordance with JWI 4210.2, *JSC Manual for the Control of Program Stock.*
    b. Pyrotechnic Storage Locker
        i. Maintain a pyrotechnic storage locker for PPA bonded pyrotechnic devices and a locker for flares and pyrotechnics for automatic release devices in accordance with USAF T.O.'s 11A10-26-7, *Pyrotechnic Signals*, 11A10-30-7, *Specialized Storage and Maintenance Procedures for Pyrotechnic Fuses and Fire Starters and Deming Flare* and 11P-1-7, *Specialized Storage and Maintenance Procedures for Cartridges for Aircrew Escape Systems.*
12) Maintain Survival Kits noted below:
    a. MBEU 20027 Survival Kit (T-38N).
        i. Inspect and test the MBEU 20027 survival kit in accordance with the Martin-Baker maintenance manuals.
    b. RSSK-8E Survival Kit (B-57).

i. Inspect and test the RSSK-8E survival kit in accordance with NAVAIR T.O. 13-1-6.3-1 and 13-1-6.3-2, *Seat Survival Kits – Aviation Crew Systems Manuals*.

13) Maintain Parachutes
   a. Inspect, test, buildup, repair, and package A/P28S21 parachutes in accordance with USAF T.O. 14D3-11-1, *Emergency Personnel Recovery Parachute*.
   b. Maintain Irwin GQ5000 parachutes for the T-38 US16LN escape system in accordance with MB526PARA, *Martin Baker T-38 Parachute Assembly Ejection Seat P/N MBEU200022 & MBEU200023 Maintenance Manual.*
14) Maintain Drogue Parachute
   a. Inspect, test, buildup, repair, and package parachutes in accordance with USAF T.O. 14D1-2-436, *Ejection Seat Drogue Chute*.
15) Maintain PCU15P Harnesses
   a. Inspect, test, buildup, and repair the PCU15P harnesses in accordance with USAF T.O. 14D3-11-1, *Emergency Personnel Recovery Parachute*.
16) Maintain PCU16P Harnesses
   a. Inspect, test, buildup, and repair the PCU16P harnesses in accordance with the Martin-Baker maintenance manuals.
17) Maintain Radios/Beacons
   a. Inspect, test, and change limited life items for radios and beacons in accordance with the manufacturer's instructions.

7.6.7 Pressure Suits and Equipment Shop

Category: Cost

The Contractor shall maintain pressure suits and pressure suit equipment in accordance with AOD 34100, *Maintenance Manual.*

7.6.8 Power Plant (Engine) Shop

Category: FP/Cost

The Contractor shall maintain a power plant (engine) shop to:

1) Perform on/off-equipment intermediate and depot level scheduled and unscheduled maintenance, modifications, preservation, depreservation, borescoping, blade blending, and configuration upgrades/control on J-85 engines/components in accordance with approved technical data.
2) Maintain engine maintenance and transportation trailers and other support equipment utilized to support engine/component maintenance.
3) Perform T-38 generator rotor balance in accordance with USAF T.O. 8A6-4-5-2, *AC Generator.*

7.6.8.1 Thrust Reverser Overhaul

Category: Cost

The Contractor shall overhaul Shuttle Training Aircraft (STA) thrust reversers in accordance with STA (N)-2-6, *STA Thrust Reverser Overhaul Manual*.

7.6.8.2 Engine Test Cell

Category: FP

The Contractor shall maintain, operate, and inspect the J-85 Engine Test Cell using the technical data below:

1) Aircraft Jet Engine Test Stand Service Inspection Work-cards contained in USAF 33D4-6-212-36(N)WC-1
2) Aircraft Jet Engine Test Stand Periodic Inspection Work-cards contained in USAF 33D4-6-212-36(N)WC-2.
3) Operate the engine test cell in accordance with USAF 2J-J85-111-1, *Engine Test, Troubleshooting, Preservation, and Post-test Handling,* and CALTECH CORP 4-50-4, *J-85 Software User's Manual, Engine Data Acquisition System*.
4) Test cell maintenance will be accomplished in accordance with USAF 33D4-6-484-4, *Engine Test Stand Noise Suppressor Model A/F32T-4IPB.*

7.6.8.3 J-85 Trim Pad

Category: FP

The Contractor shall utilize 1T-38A-2-1, *General Airplane,* when positioning an aircraft into the Trim Pad Sound Suppressor.

7.6.8.4 J-85 Shipping

Category: FP

The Contractor shall ensure NASA J-85 engines are prepared for shipment in accordance with CC-ENG-J85-001; *J-85 Shipping Instructions.*

7.6.9 Weld Shop

The Contractor shall ensure welding procedures are qualified and welding is performed in accordance with AWS D17.1, *Specification for Fusion Welding for Aerospace Applications* or other applicable approved technical data.

7.6.10 Non-Destructive Inspection (NDI) Shop

Category: FP/Cost

The Contractor shall:

1) Manage an NDI shop and ensure personnel are certified in all aspects of NDI (e.g. optical, dye-penetrant, magnetic particle, ultrasonic, eddy current, and radiographic) to support on and off-equipment inspections on all aircraft and support equipment assigned to the NASA organizations identified in SOW Subsection 1.5.1.2 of this SOW.
2) Perform non-destructive inspection.
3) Ensure NDI personnel utilize USAF T.O. 33B-1-1, *Non-Destructive Inspection Methods, Basic Theory* and 1T-38A-36, *Non-Destructive Inspection for T-38 Aircraft* as well as the guidelines stipulated in AFI21-101, *Aircraft and Equipment Management, Paragraph 5.9.4* during all aspects of NDI accomplishment. This technical data may be supplemented by other process and procedures when made available by the OEM, USAF and other NASA approved sources.
4) Ensure all discrepancies noted during any of the above methods of inspecting shall be documented in NAMIS using NASA Form 1671A, *Aircraft Maintenance Packet*.

7.7 T-38 Simulator

Category: FP

The Contractor shall maintain and inspect the T-38N ground based simulator in accordance with:

1) T-38(SIM)-5, *T-38N Simulator (N900) Maintenance Plan*
2) T-38(SIM)-6WC, *T-38N Simulator Preventative Maintenance Inspection Work Cards*

The T-38N simulator is located on-site at JSC in Building 5.

7.8 Forward Operating Locations

7.8.1 El Paso

7.8.1.1 T-38 Depot Maintenance

Category: Refer to applicable SOW paragraph for category (FP, FP/Cost, or Cost)

The Contractor shall:

1) Perform T-38 depot level work at the El Paso forward operating location.[67] In situations where relocation of the aircraft to El Paso is not possible or practical, the NASA COTR may direct the Contractor to perform the T-38 depot work at a different location.
2) Aircraft shall have a pre-dock meeting convened in accordance with AOD 34100, *Maintenance Manual* prior to induction into the depot.
3) Once the pre-dock meeting scope of work has been approved, a signed copy of the pre-dock package shall be sent to the NASA El Paso Depot Site Manager for accomplishment by the Contractor.

7.8.1.2 Aircraft Launch, Recovery, and General Maintenance

Category: Refer to applicable SOW paragraph for category (FP, FP/Cost, or Cost)

The Contractor shall provide aircraft launch, recovery, and maintenance support for T-38 and other NASA transient aircraft in El Paso.

7.8.1.3 Super Guppy Support

Category: Cost

The Contractor shall provide aircraft launch, recovery, and maintenance services for the Super Guppy in El Paso.

7.8.1.4 Aircraft Storage and Preservation

Category: Cost

The Contractor shall provide aircraft storage and preservation services in a climate that minimizes aircraft corrosion.

[67] *These services have historically been provided in El Paso due to a required NASA presence in support of the Space Shuttle Program at White Sands, available hangar space, and dry climate.*

7.8.2 Edwards

7.8.2.1 Aircraft Launch, Recovery, and General Maintenance

Category: Refer to applicable SOW paragraph for category (FP, FP/Cost, or Cost)

The Contractor shall provide aircraft launch, recovery, and maintenance support at the NASA Edwards Air Force Base FOL to support the Boeing 747 and other NASA transient aircraft. [68]

[68] *NASA anticipates that the requirement for the Edwards Air Force Base forward operating location will only be necessary until the end of Boeing 747 Shuttle Carrier operations.*

L7.0 Maintenance – LaRC Center Unique

Category: Cost (SOW Subsections L7.1 through L7.8.2.1)

The requirements listed in SOW Subsections L7.1 through L7.8.2.1 shall apply to Langley Research Center.

L7.1 General Requirements

L7.1.1 Overview

The contract provides for two-tier aircraft maintenance support (organizational and intermediate level) for NASA aircraft and support equipment (airframes, engines, appliances, and other equipment) operated at locations identified in SOW Subsection 2.2 of this SOW.[69]

L7.1.2 Other Aircraft

The Contractor shall provide aircraft maintenance and support services for other aircraft. Example aircraft may include other U.S. Government/external organization aircraft.

L7.1.3 Deliverables – Maintenance

SOW Subsection 7.1.3 not applicable.

L7.1.4 Aircraft Maintenance Program

The objective of the two-tier maintenance program is to maintain aircraft and equipment to optimize the use of personnel, facilities, material, and funds to achieve mission success. The Contractor shall:

1) Implement aircraft/equipment maintenance programs in accordance with RSD CP-0940, *LaRC General Aircraft Maintenance Manual for RSD* and approved technical data.
2) Ensure aircraft released for flight are serviceable (safe and operable) and properly configured to meet mission requirements.
3) Be responsible for planning, scheduling, forecasting, and execution of the maintenance program.
4) Ensure that planning provides the most effective and efficient use of human capital, facilities, and equipment, while reducing unscheduled maintenance, and allowing for aircraft and equipment to be returned to a flyable/usable condition with the least impact on mission success.

L7.1.5 LaRC Chief of Maintenance

The LaRC Chief of Maintenance is the Government's single point of contact for all matters associated with the two-tier maintenance program identified in this SOW and is responsible for monitoring the

[69] *The Government reserves the right to perform aircraft maintenance on Government owned aircraft, engines, accessories, and other support equipment.*

Contractor's overall maintenance effort. The Contractor shall keep the LaRC Chief of Maintenance informed on aircraft/equipment status as it applies to scheduled and unscheduled maintenance.

L7.1.6 Maintenance Discipline

See SOW Subsection 7.1.6.

L7.1.7 Aircraft Change Directive Compliance

The Contractor shall comply with all aircraft change directives (ACDs) approved by NASA (e.g. fleet modification instructions, one time inspections, one time replacements, service changes, customer bulletins, engine bulletins, airframe changes received from aircraft or component manufacturers, the FAA or the DoD).

L7.1.8 Aircraft Acceptance and Transfer

SOW Subsection 7.1.8 not applicable.

L7.1.9 FAA Part 145 Repair Station Certification

SOW Subsection 7.1.9 not applicable.

L7.2 Maintenance Programs

L7.2.1 Aircraft Logs and Records Program

The Contractor shall maintain aircraft logs and records. The Contractor shall:

1) Establish procedures in accordance with RSD CP-0940, *LaRC General Aircraft Maintenance Manual for RSD*, to ensure each person signing entries in the aircraft logs, logbooks and making entries on serviceable parts tags are trained and authorized.
2) Maintain AFTO Form 95s for each Department of Defense (DoD) supported aircraft, as a minimum, in accordance with the type/model/series -6 manual. Specific instructions for filling in the AFTO Form 95 are found in USAF T.O. 00-20-1, Chapter 10.
3) Archive all internally approved configuration documents such as Aircraft Work Orders, Experiment Software Work Requests (ESWRs), One-Time Inspections (OTIs), and One-Time Replacements (OTRs) in NAMIS as part of the completed Aircraft Maintenance Packet, NASA Form 1671A.
4) Archive other documents in NAMIS as requested by the Government.
5) Retain aircraft maintenance records in accordance with NPR 1441.1, *NASA Records Retention Schedules*, Schedule 7, Agency Filing Scheme #7900 (AFS #7900). In addition, on type-certificated aircraft, records shall be maintained in accordance with 14 CFR Section 91.417, *Maintenance Records*.

L7.2.2 Product Identification and Traceability Program

See SOW Subsection 7.2.2.

L7.2.2.1 Disposition of Aircraft Parts

See SOW Subsection 7.2.2.1.

L7.2.3 Trend Analysis Program

SOW Subsection 7.2.3 not applicable.

L7.2.4 Tool and Equipment Control Program

The Contractor shall:

1) Adhere to established LaRC tool and equipment management control program to prevent and eliminate foreign object damage (FOD) to aircraft, engines, training and support equipment, and to reduce costs through strict accountability, control and security of common hand tools, special tools, test equipment, support equipment, and other assets.
2) Use the requirements contained in RSD CP-0940, *LaRC General Aircraft Maintenance Manual for RSD* to ensure that effective tool control is practiced and all tools are accounted for during all phases of maintenance. The Contractor is authorized to add additional requirements for each operating location to ensure positive inventory controls and lost tool reporting.

L7.2.5 Foreign Object Debris (FOD) Prevention Program

The Contractor shall establich and enforce a foreign object elimination (FOE)/foreign object damage (FOD) program for NASA facilities and operating areas in accordance with RSD CP-0940, *LaRC General Aircraft Maintenance Manual for RSD*.

L7.2.6 Facility Services

The Contractor shall promote a safe and secure work environment in accordance with RSD policies and directives. In addition to those requirements, the Contractor's responsibilities shall include:

1) Promote a "clean as you go program." All employees shall ensure the work area is clean:
    a. Prior to starting an operation
    b. As an operation progresses and work debris accumulates
    c. When an operation cannot continue
    d. After an operation is completed and prior to inspection and work sign-off
    e. At the end of the shift.
2) Maintain a clean and orderly work area with necessary tools, materials, and equipment in their places of orderly arrangement.
3) Ensure foreign object debris cans and containers, trash cans, and other disposal cans are strategically placed throughout the workplace to prevent foreign objects from migrating into

aerospace products. These containers shall be clearly marked to avoid co-mingling of various types of debris.

4) Maintain hangar floor cleanliness and safety:
    a. Clean hangar floors to ensure free from dirt, grease, and oil. Machine scrub hangar floors once a week minimum to remove built-up dirt, soil or other foreign materials to prevent slip hazards.
    b. Ensure hangar corners and areas under stairwells are cleaned at least once per month.
    c. Remove standing water from interior of hangar or other work areas following foul weather. The Contractor shall display "wet floor" caution signs when cleaning these areas where people are or shall be present before floors are dry.
    d. Hangar spills shall be cleaned up immediately.
    e. Sweep all hangars (to include areas under hangared aircraft) and shop areas and ensure equipment and materials are properly stored at the end of the shift and work day.
5) Stow cables in "walk-overs" when in use. Cable and "walk-overs" shall be stowed when not in use to avoid trip hazards.
6) Ensure aircraft positioned in the hangar have drip pans placed under them.
7) Ensure the safe use, handling, storage and disposition of materials, including hazardous materials, used in support of aircraft maintenance and in the support shops. Products and materials such as flammables and combustibles shall be stored in approved flammable materials storage cabinets. Products that are not compatible (when stored together) shall be stored separately. Small quantities of flammable and combustible materials may be kept in the shop, hangars and other such work areas where it is safe to do so.

L7.2.7 Weight and Balance Program

SOW Subsection 7.2.7 not applicable.

L7.2.8 Corrosion Prevention and Control Program

SOW Subsection 7.2.8 not applicable.

L7.2.9 Fuel Surveillance Program

The Contractor shall conduct a fuel surveillance program in accordance with RSD policies.

L7.2.10 Hydraulic Contamination and Prevention Program

SOW Subsection 7.2.10 not applicable.

L7.2.11 Joint Oil Analysis Program (JOAP)

SOW Subsection 7.2.11 not applicable.

L7.2.12 Electrostatic Discharge (ESD) Program

SOW Subsection 7.2.12 not applicable.

L7.2.13 Aviators Breathing Oxygen Surveillance (ABO) Program

SOW Subsection 7.2.13 not applicable.

L7.2.14 Support Equipment (SE) Program

SOW Subsection 7.2.14 not applicable.

L7.2.15 Slings and Lifting Device Program

SOW Subsection 7.2.15 not applicable.

L7.2.15.1 Critical Lifts

SOW Subsection 7.2.15.1 not applicable.

L7.2.15.2 Pre-lift Documentation

SOW Subsection 7.2.15.2 not applicable.

L7.2.15.3 Slings and Rigging Equipment

SOW Subsection 7.2.15.3 not applicable.

L7.2.15.4 Suspended Load Approval

SOW Subsection 7.2.15.4 not applicable.

L7.3 Maintenance Control

SOW Subsection 7.3 not applicable.

L7.3.1 Aircraft Release Authority

See SOW Subsection 7.3.1.

L7.3.2 Static Display and Training Aircraft

SOW Subsection 7.3.2 not applicable.

L7.3.3 Lightning/Sudden Severe Weather

The Contractor shall comply with lightning/sudden severe weather requirements in accordance with LaRC standards and processes.

L7.4 Scheduled and Unscheduled Maintenance

L7.4.1 Aircraft Maintenance

The Contractor shall perform two-tier scheduled and unscheduled aircraft maintenance (organizational and intermediate) in accordance with approved technical data.[70]

L7.4.2 Aviators Life Support Systems and Equipment Maintenance (Option 4 – See SOW Subsection 12.4.2)

See SOW Subsection 7.4.2.

L7.4.3 Powered, Non-Powered, and Calibrated Support Equipment

See SOW Subsection 7.4.3.

L7.4.4 Off-Station Maintenance

The Contractor shall:

1) Follow the requirements outlined in RSD CP-0940, *LaRC General Aircraft Maintenance Manual for RSD* for coordinating off-station repair actions.
2) Obtain advance approval to dispatch Contractor personnel from the NASA Maintenance to troubleshoot/repair off-station aircraft.

L7.4.5 Flight Line Services

L7.4.5.1 Aircraft Ground Handling/Servicing

See SOW Subsection 7.4.5.1.

L7.4.5.2 Launch and Recovery

See SOW Subsection 7.4.5.2.

L7.4.5.3 Aircraft Ready Times

The Contractor shall ensure all aircraft are ready for flight to meet the timelines specified in RSD operations policies.

L7.5 Production Control

SOW Subsection 7.5 not applicable.

[70] See *Appendix B for definitions of "scheduled" and "unscheduled" maintenance.*

L7.6 Support Services

L7.6.1 General

The Contractor shall provide support services for scheduled and unscheduled maintenance to include the repair, alteration, fabrication, test and check, reclamation, rebuild and overhaul of parts, assemblies, sub-assemblies and end-items in accordance with approved technical data.[71] Example services include:

1) Electrical Systems
2) Communications and Navigation (COM/NAV) Systems
3) Sheetmetal and Composites
4) Battery
5) Machining
6) Test and Check Capabilities
7) Inspecting
8) Rework, repair and inspecting powered and non-powered support equipment
9) Calibration of designated equipment

L7.6.2 Component Repair Listing

L7.6.2.1 T-38/J85 Items

SOW Subsection 7.6.2.1 not applicable.

L7.6.2.2 Other Items

See SOW Subsection 7.6.2.2 not applicable.

L7.6.3 Support Shop Test Equipment and Tooling

SOW Subsection 7.6.3 not applicable.

L7.6.4 Support Equipment Shop

SOW Subsection 7.6.4 not applicable.

L7.6.5 Egress Systems Shop (Option 4 – See SOW Subsection 12.4.3)

The Contractor shall be responsible for maintaining the ejection seats for current OV-10s and any future aircraft requirements.

Example responsibilities include:

[71] *See Subsection1.5.2.1 for LaRC facility listing.*

1) Ensure all egress maintenance, to include removal and installation, inspection, repair, and modification shall be accomplished in accordance with AFI 21-101, *Aircraft and Equipment Management, Chapter 16* and other egress or OEM specific technical data as applicable.
2) Utilize approved demand response team when directed by technical data during any task requiring the removal/installation of explosive components, and during egress final inspections.
3) Ensure only trained and qualified egress personnel install and remove parachutes and survival kits that are integral parts of ejection seats.

L7.6.5.1 Egress Support Equipment

SOW Subsection 7.6.5.1 not applicable.

L7.6.5.2 Aircraft Canopy System

SOW Subsection 7.6.5.2 not applicable.

L7.6.5.3 Survival Beacon Activation

SOW Subsection 7.6.5.3 not applicable.

L7.6.5.4 Explosives

SOW Subsection 7.6.5.4 not applicable.

L7.6.5.4.1 Egress Work Center Explosive Locker

SOW Subsection 7.6.5.4.1 not applicable.

L7.6.5.4.2 Storage

SOW Subsection 7.6.5.4.2 not applicable.

L7.6.5.4.3 Transportation

SOW Subsection 7.6.5.4.3 not applicable.

L7.6.5.4.4 Defects

SOW Subsection 7.6.5.4.4 not applicable.

L7.6.6 Personal Equipment Shop

The Contractor shall operate the personal equipment shop as delineated in RSD directives. The Contractor shall:

1) Maintain records for each individual requiring flight gear.
2) Provide assistance to aircrew to ensure personal flight equipment fits properly.
3) Clean and maintain flight gear in accordance with approved technical data.
4) Fabricate and repair soft goods, both aircraft related and non-aircraft related. Pattern making and sewing skills are required to manufacture items, such as seat cushion covers, flight clothing bags, aircraft intake covers, equipment covers, aircraft forms bags, aircraft interior panel/seat covers, any items per engineering or end user drawings, and applicable technical data.
5) Fabricate labels, signs, and nametags.
6) Maintain, inspect, and replenish first aid kits.

7) Handle, store, and forecast explosive devices utilized to support in-flight clothing and personal equipment.
8) Maintain, inspect and set up night vision goggles in accordance with manufacturer's instructions.
9) Inspect, test, build-up, repair, and assemble smoke masks in accordance with approved technical data.
10) Maintain flight crew oxygen masks in accordance with approved technical data.
11) Maintain storage noted below:
    a. Bonded Storage Area
        i. Maintain bonded storage areas for personal parachute assemblies (PPAs) and their components.
    b. Pyrotechnic Storage Locker
        i. Maintain a pyrotechnic storage locker for PPA bonded pyrotechnic devices and a locker for flares and pyrotechnics for automatic release devices in accordance with USAF T.O.'s 11A10-26-7, *Pyrotechnic Signals*, 11A10-30-7, *Specialized Storage and Maintenance Procedures for Pyrotechnic Fuses and Fire Starters and Deming Flare* and 11P-1-7, *Specialized Storage and Maintenance Procedures for Cartridges for Aircrew Escape Systems.*
12) Maintain Survival Kits for specific flight missions as required.
13) Maintain Radios/Beacons
    a. Inspect, test, and change limited life items for radios and beacons in accordance with the manufacturer's instructions.

L7.6.7 Maintain Pressure Suits and Equipment

SOW Subsection 7.6.7 not applicable.

L7.6.8 Power Plant (Engine) Shop

SOW Subsection 7.6.8 not applicable.

L7.6.8.1 Thrust Reverser Overhaul

SOW Subsection 7.6.8.1 not applicable.

L7.6.8.2 Engine Test Cell

SOW Subsection 7.6.8.2 not applicable.

L7.6.8.3 J-85 Trim Pad

SOW Subsection 7.6.8.3 not applicable.

L7.6.8.4 J-85 Shipping

SOW Subsection 7.6.8.4 not applicable.

L7.6.9 Weld Shop

SOW Subsection 7.6.9 not applicable.

L7.6.10 Non-Destructive Inspection (NDI) Shop

SOW Subsection 7.6.10 not applicable.

L7.7 T-38 Simulator

SOW Subsection 7.7 not applicable.

L7.8 Forward Operating Locations

SOW Subsection 7.8 not applicable.

L7.8.1 El Paso

SOW Subsection 7.8.1 not applicable.

L7.8.1.1 T-38 Depot Maintenance

SOW Subsection 7.8.1.1 not applicable.

L7.8.1.2 Aircraft Launch, Recovery, and General Maintenance

SOW Subsection 7.8.1.2 not applicable.

L7.8.1.3 Super Guppy Support

SOW Subsection 7.8.1.3 not applicable.

L7.8.1.4 Aircraft Storage and Preservation

See SOW Subsection 7.8.1.4 not applicable.

L7.8.2 Edwards

See SOW Subsection 7.8.2 not applicable.

L7.8.2.1 Aircraft Launch, Recovery, and General Maintenance

See SOW Subsection 7.8.2.1 not applicable.

8.0 Engineering

8.1 General Requirements

8.1.1 Overview

Category: Cost

The Contractor shall provide engineering support services for aircraft, payload, and support equipment development, repairs, and upgrades. The Contractor shall work with NASA engineers as required to support mission requirements. The engineering support will cover both public use and FAA certificated aircraft. Support shall be provided in a timely manner to maximize aircraft or equipment availability. Example engineering support services include:

1) Aircraft maintenance support
2) Aircraft sustainment (e.g. locating supportable parts or repair procedures)
3) Aircraft upgrades
4) Aircraft troubleshooting
5) Aircraft ground and flight testing
6) Aircraft Service Changes and Customer Bulletins evaluation
7) Ground support equipment design, troubleshooting, and testing
8) Payload integration and testing
9) Generate technical specifications and supporting documentation in support of procurements
10) Technical interface with other Government agencies and commercial companies

8.1.2 Deliverables

Category: Cost

The Contractor shall provide the engineering deliverables listed in Table 8-1.

Table 8-1: Data Requirement Description - Engineering[72]

Data Requirement List (DRL) Item No.	DRD Title
DRD-E01	Electrical Computer Aided Design Migration Plan

[72] *Refer to Section J, Appendix J1 for DRD requirements.*

8.1.3 Task Delegation

Category: Cost

NASA will assign individual engineering support tasks to the Contractor via a Task Transmittal as defined in AOD 33841, *Task Transmittal – Engineering (TTE)*. The Contractor shall provide a written response to the TTE per the requirements defined in AOD 33841 within three (3) workdays.

8.1.4 Task Support and Administration

Category: Cost

The Contractor shall conduct engineering tasks per the following AOD work instructions:

1) AOD 33819 *Fleet Modification Instructions*
2) AOD 33820 *Engineering Projects*
3) AOD 33840 *Flight Readiness Review, Test Readiness Review, and Payload Readiness Review.*
4) AOD 33842 *Preparation of Engineering Work Orders*

8.1.5 Engineering Schedule

Category: Cost

The Contractor shall provide a schedule for all assigned engineering tasks. The Contractor shall work with NASA to develop the schedule content. The Contractor shall:

1) Provide schedule support for all assigned tasks. Example schedule items include:
    a. Resource allocation
    b. Design completion
    c. Analysis completion
    d. Drawing release
    e. Design reviews
    f. Airworthiness reviews
    g. Logistics and manufacturing
    h. Flight, test, & payload readiness reviews
    i. Test schedules
    j. Engineering Work Order release schedule
2) Provide weekly schedule updates to NASA management.
3) Notify and receive approval for any schedule adjustments to NASA management as required.
4) Maintain baseline schedules to track schedule variance.

8.1.6 Engineering Cost Estimates

Category: Cost

The Contractor shall supply engineering cost estimates (e.g. labor hours, material costs, subcontract costs) when requested by NASA. Example cost estimates include:

1) Aircraft repair costs
2) Aircraft upgrade costs
3) Aircraft troubleshooting and testing costs
4) Aircraft payload integration costs

8.1.7 Engineering Programs

8.1.7.1 Airworthiness Reviews

Category: Cost

The Contractor shall support or present engineering airworthiness reviews per AOD 33820, *Engineering Projects.*

8.1.7.2 Flight, Test, and Payload Readiness Reviews

Category: Cost

The Contractor shall support or present flight, test, and payload readiness reviews per AOD 33840, *Flight Readiness Review, Test Readiness Review, and Payload Readiness Review.*

8.2 Systems Engineering

Category: Cost

The Contractor shall implement a systems engineering process for all engineering tasks to support aircraft, payload, and ground support equipment development, repairs, or upgrades. The Contractor shall reference NASA/SP-2007-6105, *NASA Systems Engineering Handbook* for guidance. The goal of the systems engineering process is to provide optimal designs with an emphasis on increasing standardization, decreasing maintenance, and reducing technical risk. Example systems engineering tasks include:

1) Develop system architectures
2) Define and allocate requirements
3) Define and assess interfaces
4) Define, assess, and mitigate risks
5) Evaluate design tradeoffs to facilitate optimal designs based on cost, schedule and technical risk
6) Define verification and validation requirements
7) Support technical document development and reviews
8) Communicate system design goals across engineering and maintenance teams

8.3 Design

8.3.1 General Requirements

Category: Cost

The Contractor shall:

1) Conduct design and development activities in accordance with JPR 1281.4, *Design and Development*.
2) Reference AOD 8594002, *Design and Analysis Handbook, Aircraft Operations Division* for design guidance.
3) Conduct technical peer reviews for all engineering documentation, designs, and drawings prior to release. Example peer review tasks include:
    a. Review documentation/drawings to minimize errors
    b. Review documentation/drawings to ensure design suitability
    c. Review documentation/drawings to ensure fabrication feasibility

8.3.2 Drafting and Computer Aided Design

8.3.2.1 Drawing Generation

Category: Cost

The Contractor shall provide drafting and Computer Aided Design (CAD) services to support aircraft, payload, and ground support equipment development, repairs, or upgrades. The CAD systems (AutoCAD and Pro/Engineer) will be Government furnished but shall be Contractor installed, operated, and maintained. The Contractor shall:

1) Provide drafting and CAD support. Example tasks include:
    a. Electrical schematic generation
    b. Printed circuit board design drawings
    c. Wire list generation
    d. Mechanical design drawings
    e. Sheet metal design drawings
    f. Structural design drawings
    g. System level drawing generation
    h. Aircraft configuration drawings
    i. Drawing trees
    j. Generating and maintaining CAD standards
2) Create all designs and drawings using the AutoCAD or Pro/Engineer CAD systems. The CAD software versions shall be compatible with current AOD versions.
3) Create and maintain all drawings in accordance with AOD 33849, *Engineering Work Instruction, Engineering Drawing Format, Requirements, and Procedures*.
4) Place a priority on using Pro/Engineer for mechanical/structural design tasks.
5) Receive approval for all changes or upgrades to the CAD system software or drawing standards by the AOD Engineering Branch Chief.
6) Scan or convert all drawings into Portable Document Format (PDF).
7) Provide access to all newly created or modified engineering drawings in both Portable Document Format (PDF) and native file formats. One PDF file shall contain all of the drawing sheets and Drawing Change Notices (DCNs) for one drawing/document number.
8) Support NASA civil servant CAD system installation and maintenance when requested by NASA.

8.3.2.2 Drawing Checking

Category: Cost

The Contractor shall ensure that all drawings are checked per AOD 33849, *Engineering Work Instruction, Engineering Drawing Format, Requirements, and Procedures* prior to release to minimize drawing and design errors and ensure drawings meet AOD 33849 standards.

8.3.2.3 Scanning and Duplication

Category: Cost

The Contractor shall provide scanning and duplication support services. Example tasks include:

1) Provide maintenance services for Government provided scanning, duplicating, and aperture card reader equipment.
2) Provide support to scan, electronically store, and print paper copies of engineering drawings up to "J" size (34" wide x 48" to 144" long).[73]
3) Provide support to print paper copies of drawings from aperture cards up to "C" size (17" x 22").[73]
4) Provide support to print drawings up to "J" size at the El Paso forward operating location.[73]

8.3.3 Electrical Engineering

Category: Cost

The Contractor shall provide electrical engineering services to support aircraft, payload, and ground support equipment development, repairs, or upgrades. Example electrical engineering tasks include:

1) Avionics integration (Aeronautical Radio Incorporated (ARINC) and Mil-Std data buses)
2) Line Replaceable Unit (LRU) design and integration
3) Circuit design (analog and digital)
4) Wire harness design
5) Payload electrical interface design
6) Data recorder programming and data post-processing (e.g. Ballard Technology data recorders, Ballard CoPilot analysis software, Aeroflex Datatrac, reduced gravity accelerometer data recorder)
7) Troubleshooting using electrical and avionics test equipment (e.g. multimeters, oscilloscopes, avionics test equipment, buss analyzers, aircraft ground support equipment)

[73] *This service shall be accessible by all AOD Engineering Branch members (contractor and civil servant).*

8.3.4 Mechanical/Aerospace Engineering

Category: Cost

The Contractor shall provide mechanical/aerospace engineering services to support aircraft, payload, or ground support equipment development, repairs, or upgrades. Example mechanical/aerospace engineering tasks include:

1) Repairs to aircraft or equipment that are beyond the scope of DoD Technical Orders, manufacturer's repair manuals, or routine aircraft maintenance manuals
2) Material Review Board (MRB) generation per AOD 33842, *Preparation of Engineering Work Orders*
3) Sheet metal design
4) Machined component design
5) Welded component design
6) Composite design
7) Pneumatic and hydraulic system design

8.3.5 Quality Engineering

Category: Cost

The Contractor shall provide quality engineering services to support aircraft, payload, and ground support equipment development, repairs, and upgrades. Example quality engineering tasks include:

1) Ensure, design, fabrication, modification/integration instructions (e.g. EWOs), and inspection processes satisfy NASA, FAA, and other statutory requirements as applicable
2) Review drawings to ensure proper process callouts (e.g. heat treat, weld inspection, coatings, plating, electrical fabrication requirements, etc.)
3) Identify critical components and corresponding inspection requirements
4) Perform root cause analyses and develop corrective actions
5) Perform Failure Modes and Effects Analysis (FMEA)
6) Perform trend analysis
7) Coordinate quality and inspection processes for components fabricated via subcontract (e.g. dimensional inspection, weld inspection)
8) Provides inspection skill training

8.4 Analysis

8.4.1 Structural Analysis

Category: Cost

The Contractor shall provide structural analysis services to substantiate aircraft, payload, or ground support equipment development, repairs, or upgrades. Structural analyses shall be prepared and documented per AOD 8594001, *Preparation of Stress Analysis Reports*. Example tasks include:

1) Handbook calculations and finite element analyses of airframe structures
2) Handbook calculations and finite element analyses of payload structures
3) Handbook calculations and finite element analyses of ground support equipment
4) Handbook calculations and finite element analyses for aircraft repairs
5) Weight and balance calculations

8.4.2 Electrical Analysis

Category: Cost

The Contractor shall provide electrical analysis services to substantiate aircraft, payload, or ground support equipment development, repairs, or upgrades. Example tasks include:

1) Electrical loads analysis
2) Circuit analysis
3) RF analysis including antenna pattern analysis, interference, and usage
4) Bus analysis
5) Timing analysis
6) Electromagnetic Interference (EMI) or Radio Frequency Interference (RFI) analysis

8.4.3 Failure Mode Effects and Criticality Analysis (FMECA)

Category: Cost

The Contractor shall perform failure mode effects and criticality analyses when requested by NASA. The FMECA shall meet the intent of MIL-STD-1629, *Procedures for Performing a Failure Mode, Effects and Criticality Analysis* and NASA/SP-2007-6105, *NASA Systems Engineering Handbook*.

8.4.4 Hazard Analysis

Category: Cost

The Contractor shall perform hazard analyses when requested by NASA. Hazard analyses for aircraft, payloads, and support equipment shall be in accordance with AOD 33840, *Flight Readiness Review, Test Readiness Review, and Payload Readiness Review.*

8.5 Engineering Troubleshooting & Testing

8.5.1 Engineering Troubleshooting

Category: Cost

The Contractor shall provide engineering troubleshooting services to assist maintenance personnel in resolving aircraft, payload, and ground support equipment issues. The goal shall be to resolve issues quickly to minimize aircraft downtime. Example engineering troubleshooting tasks include:

1) Diagnosing and resolving aircraft equipment failures
2) Diagnosing and resolving electrical or mechanical interface issues between NASA aircraft and customer payloads

The Contractor shall:

1) Provide engineering troubleshooting support on-call, twenty-four (24) hours a day based on mission demands
2) Provide on-the-aircraft engineering troubleshooting support as required at NASA Centers, NASA forward operating location, or other CONUS or OCONUS location based on mission demands

8.5.2 Engineering Testing

Category: Cost

The Contractor shall provide engineering test services for aircraft, payloads, and ground support equipment. Example testing tasks include:

1) Develop ground and flight test plans
2) Verify and validate the operation and safety of new designs, upgrades, and repairs
3) Flight Testing – Select instrumentation, perform data collection, and analyze data to evaluate aircraft system performance and identify flight anomalies. Flight test plans and reports shall be per AOD 33843, *Flight Test, Aircraft Operations Division*
4) Ground Testing – Select instrumentation, perform data collection, and analyze data for aircraft and payload systems to evaluate system performance and identify anomalies
5) Bench Testing – Perform integration and testing of new or modified systems to verify operation and identify anomalies
6) Perform troubleshooting using schematics and diagnostic equipment to support maintenance personnel
7) Perform propulsion system performance assessments
8) Generate test reports

8.5.3 Engineering Test Equipment

Category: Cost

The Contractor shall maintain inventory and provide check-in and check-out services for engineering test equipment. Example test equipment includes:

1) Multi-meters
2) Test equipment
3) Flight test data recorders
4) Test cables, connectors, probes
5) Data buss analyzers
6) Computer equipment
7) Cameras

8.6 Engineering Logistics Liaison

Category: Cost

The Contractor shall provide engineering logistics liaison services. The logistics liaison shall serve as an interface between the engineering group and the Contractor logistics group and shall reside in the AOD engineering branch. Example engineering logistics tasks include:

1) Supporting NASA engineering team members to review bill of materials on engineering drawings for accuracy and completeness.
2) Generating parts lists based on Bill of Materials or via engineering request.
3) Generating procurement requests to the Contractor logistics group.
4) Tracking part status working with the Contractor logistics group to ensure timely part arrival.
5) Providing delivery status reports by project to engineering as requested.
6) Identifying delivery issues and develop plan of action to resolve.
7) Coordinating the build-up of aircraft upgrade and payload integration kits.

8.7 Engineering Technical Writing Liaison

Category: Cost

The Contractor shall provide engineering technical writing liaison services. The technical writing liaison shall serve as an interface between the engineering group and the AOD documentation group and shall reside in the AOD engineering branch. Documentation development and revisions shall be in accordance with AOD 34100, *Maintenance Manual*. Example technical writing tasks include:

1) Technical Order (T.O.) revisions based on engineering repairs, upgrades, or revisions (e.g. AOD Form 21 generation support per AOD 34100, *Maintenance Manual*).
2) Flight manual revisions based on engineering upgrades or revisions.
3) Engineering work instruction development support or revisions.
4) Engineering report or documentation generation support.

8.8 Supplementary Engineering Support Services

Category: Cost

The Contractor shall provide the engineering support services listed in SOW Subsections 8.8.1 through 8.8.5 below. These services shall support surges in engineering workload or provide supplementary support for projects requiring unique engineering specialties. The Contractor shall:

1) Coordinate a meeting with NASA within three (3) workdays following task assignment for initial discussions.
2) Commence work on the assigned task within fifteen (15) workdays following NASA request or per mutually agreed schedule at time of task assignment.
3) Deliver all non-proprietary reports, computer models, and electronic files generated by the support service provider to NASA.
4) Provide all non-proprietary data to NASA in the native file format of the originating system. For example, a finite element analysis model created using MSC NASTRAN, shall be delivered to NASA in the original MSC NASTRAN format.

8.8.1 Structural Analysis

Category: Cost

The Contractor shall provide structural analysis services to supplement the analysis requirements listed in SOW Subsection 8.4.1. Structural analyses shall be prepared and documented per AOD 8594001, *Preparation of Stress Analysis Reports*. In addition to the requirements listed in SOW Subsection 8.4.1, the structural analysis service provider shall provide the following analysis support:

1) Non-linear analysis (e.g. buckling/stability)
2) Vibration analysis
3) Composites analysis
4) Pressure vessel analysis

8.8.2 Aerodynamic Analysis

Category: Cost

The Contractor shall provide aerodynamic analysis services to support aircraft and payload development, repairs, or upgrades. Example aerodynamic analysis tasks include:

1) Perform assessments of the aeronautical impacts of aircraft alterations on aircraft stability, control, and performance.
2) Perform assessments of aerodynamic loading on aircraft structures and flight controls.
3) Perform aerodynamic assessment of payload installations.
4) Perform flutter analysis.

8.8.3 Materials Engineering & Testing

Category: Cost

The Contractor shall provide materials engineering and testing services. Example materials engineering and testing tasks include:

1) Root cause analysis of component failures due to fatigue, corrosion, wear, overloading, or other failure modes.
2) Recommendations for materials selection based on aircraft or ground support equipment design or repairs.
3) Mechanical testing. Test lab shall be accredited by the American Association for Laboratory Accreditation (A2LA) for testing aerospace grade materials.

8.8.4 Software Engineering

Category: Cost

The Contractor shall provide software engineering services to support aircraft, payload, and ground support equipment development, repairs, and upgrades. Example software engineering tasks include:

1) Data recorder programming and data post-processing (e.g. Government provided equipment: Ballard Technology data recorders, Ballard CoPilot analysis software, Aeroflex Datatrac, reduced gravity accelerometer data post-processing).
2) Line Replaceable Unit (LRU) software development or modification (e.g. Government provided equipment: in-house designed T-38 combined electronics unit).
3) Avionics special test equipment software development or modification (e.g. Government provided equipment: in-house designed T-38 combined electronics unit special test equipment).
4) Software programming support. Example programming languages may include: C++, Java, SQL, and Microsoft .NET framework.
5) Simulation software applications (e.g. Spice, MATLAB, Mathematica, Simulink).
6) Macro generation for Microsoft products.

8.8.5 FAA Designated Engineering Representative Support

Category: Cost

The Contractor shall provide FAA appointed Designated Engineering Representative (DER) services in the appropriate engineering discipline when required for repairs or alterations on FAA type-certificated aircraft or per NASA request.

L8.0 Engineering – LaRC Center Unique

(Option – 4, See SOW Subsection 12.4.4)

Category: Cost (SOW Subsections L8.1 through L8.8.5)

The requirements listed in SOW Subsections L8.1 through L8.8.5 shall apply to Langley Research Center.

L8.1 General Requirements

L8.1.1 Overview

The Contractor shall provide engineering support services for aircraft, payload, and support research equipment development, repairs, and upgrades. The Contractor shall work with NASA engineers as required to support mission requirements. The engineering support will cover both public use and FAA certificated aircraft. Support shall be provided in a timely manner to maximize aircraft or equipment availability. Example engineering support services include:

1) Aircraft maintenance support
2) Aircraft sustainment (e.g. locating supportable parts or repair procedures)
3) Aircraft upgrades
4) Aircraft troubleshooting
5) Aircraft ground and flight testing
6) Aircraft Service Changes and Customer Bulletins evaluation
7) Ground support equipment design, troubleshooting, and testing
8) Payload integration and testing
9) Generate technical specifications and supporting documentation in support of procurements
10) Technical interface with other Government agencies and commercial companies

L8.1.2 Deliverables

SOW Subsection 8.1.2 not applicable.

L8.1.3 Task Delegation

SOW Subsection 8.1.3 not applicable.

L8.1.4 Task Support and Administration

SOW Subsection 8.1.4 not applicable.

L8.1.5 Engineering Schedule

SOW Subsection 8.1.5 not applicable.

L8.1.6 Engineering Cost Estimates

SOW Subsection 8.1.6 not applicable.

L8.1.7 Engineering Programs

See SOW Subsection 8.1.7.

L8.1.7.1 Airworthiness Reviews

The Contractor shall support or present engineering airworthiness reviews in accordance with LaRC directives.

L8.1.7.2 Flight, Test, and Payload Readiness Reviews

The Contractor shall support or present flight, test, and payload readiness reviews per LaRC directives.

L8.2 Systems Engineering

SOW Subsection 8.2 not applicable.

L8.3 Design

L8.3.1 General Requirements

SOW Subsection 8.3.1 not applicable.

L8.3.2 Drafting and Computer Aided Design

L8.3.2.1 Drawing Generation

The Contractor shall provide drafting and Computer Aided Design (CAD) services to support aircraft, payload, and ground support equipment development, repairs, or upgrades. The CAD systems (AutoCAD and Pro/Engineer) will be Government furnished but shall be Contractor installed, operated, and maintained. The Contractor shall:

1) Provide drafting and CAD support. Example tasks include:
    a. Electrical schematic generation
    b. Printed circuit board design drawings
    c. Wire list generation
    d. Mechanical design drawings
    e. Sheet metal design drawings
    f. Structural design drawings
    g. System level drawing generation
    h. Aircraft configuration drawings
    i. Drawing trees
    j. Generating and maintaining CAD standards

2) Create all designs and drawings using the AutoCAD or Pro/Engineer CAD systems. The CAD software versions shall be compatible with current AOD versions.
3) Create and maintain all drawings in accordance with LaRC Center processes and RSD procedures.
4) Place a priority on using Pro/Engineer for mechanical/structural design tasks.
5) Receive approval for all changes or upgrades to the CAD system software or drawing standards by the designated evaluator.
6) Scan or convert all drawings into Portable Document Format (PDF).
7) Provide access to all newly created or modified engineering drawings in both Portable Document Format (PDF) and native file formats. One PDF file shall contain all of the drawing sheets and Drawing Change Notices (DCNs) for one drawing/document number.
8) Support NASA civil servant CAD system installation and maintenance when requested by NASA.

L8.3.2.2 Drawing Checking

The Contractor shall ensure that all drawings are checked prior to release to minimize drawing and design errors and ensure drawings meet AOD 33849 standards.

L8.3.2.3 Scanning and Duplication

The Contractor shall provide scanning and duplication support services as required.

L8.3.3 Electrical Engineering

The Contractor shall provide electrical engineering services to support aircraft, payload, and ground support equipment development, repairs, or upgrades. Example electrical engineering tasks include:

1) Avionics integration (ARINC and Mil-Std data buses)
2) Line Replaceable Unit (LRU) design and integration
3) Circuit design (analog and digital)
4) Wire harness design
5) Payload electrical interface design
6) Data recorder programming and data post-processing
7) Troubleshooting using electrical and avionics test equipment (e.g. multimeters, oscilloscopes, avionics test equipment, buss analyzers, aircraft ground support equipment)

L8.3.4 Mechanical/Aerospace Engineering

The Contractor shall provide mechanical/aerospace engineering services to support aircraft, payload, or ground support equipment development, repairs, or upgrades. Example mechanical/aerospace engineering tasks include:

1) Repairs to aircraft or equipment that are beyond the scope of DoD Technical Orders, manufacturer’s repair manuals, or routine aircraft maintenance manuals
2) Sheet metal design
3) Machined component design

4) Composite design

L8.3.5 Quality Engineering

SOW Subsection 8.3.5 not applicable.

L8.4 Analysis

L8.4.1 Structural Analysis

The Contractor shall provide structural analysis services to substantiate aircraft, payload, or ground support equipment development, repairs, or upgrades. Example structural analysis tasks include:

1) Handbook calculations and finite element analyses of airframe structures
2) Handbook calculations and finite element analyses of payload structures
3) Handbook calculations and finite element analyses of ground support equipment
4) Handbook calculations and finite element analyses for aircraft repairs
5) Weight and balance calculations

L8.4.2 Electrical Analysis

See SOW Subsection 8.4.2.

L8.4.3 Failure Mode Effects and Criticality Analysis (FMECA)

See SOW Subsection 8.4.3.

L8.4.4 Hazard Analysis

The Contractor shall perform hazard analyses when requested by NASA. Hazard analyses for aircraft, payloads, and support equipment shall be in accordance with LaRC/RSD directives.

L8.5 Engineering Troubleshooting & Testing

L8.5.1 Engineering Troubleshooting

See SOW Subsection 8.5.1.

L8.5.2 Engineering Testing

The Contractor shall provide engineering test services for aircraft, payloads, and ground support equipment. Example testing tasks include:

1) Develop ground and flight test plans
2) Verify and validate the operation and safety of new designs, upgrades, and repairs

3) Flight Testing – Select instrumentation, perform data collection, and analyze data to evaluate aircraft system performance and identify flight anomalies.
4) Ground Testing – Select instrumentation, perform data collection, and analyze data for aircraft and payload systems to evaluate system performance and identify anomalies
5) Bench Testing – Perform integration and testing of new or modified systems to verify operation and identify anomalies
6) Perform troubleshooting using schematics and diagnostic equipment to support maintenance personnel
7) Perform propulsion system performance assessments
8) Generate test reports

L8.5.3 Engineering Test Equipment

SOW Subsection 8.5.3 not applicable.

L8.6 Engineering Logistics Liaison

SOW Subsection 8.6 not applicable.

L8.7 Engineering Technical Writing Liaison

SOW Subsection 8.7 not applicable.

L8.8 Supplementary Engineering Support Services

SOW Subsection 8.8 not applicable.

L8.8.1 Structural Analysis

SOW Subsection 8.8.1 not applicable.

L8.8.2 Aerodynamic Analysis

SOW Subsection 8.8.2 not applicable.

L8.8.3 Materials Engineering & Testing

SOW Subsection 8.8.3 not applicable.

L8.8.4 Software Engineering

SOW Subsection 8.8.4 not applicable.

L8.8.5 FAA Designated Engineering Representative Support

SOW Subsection 8.8.5 not applicable.

9.0 Logistics

9.1 General

Category: FP

The Contractor shall provide logistics support services for the locations listed in SOW Subsection 2.2.1. The Contractor shall utilize the NASA Aircraft Management Information System (NAMIS) in accordance with SOW Subsection 4.11.1 of this SOW for all functional areas and processes required to support logistics. More information on the functional areas and logistics processes supported by NAMIS can be found in AOD 33862, *Volume IV NAMIS Requirements – Aircraft Logistics System Level 5 Requirements.*[74]

9.2 Deliverables – Logistics

Category: FP

The Contractor shall provide the logistics deliverables listed in Table 9-1.

Table 9-1: Data Requirement Description - Logistics[75]

Data Requirement List (DRL) Item No.	DRD Title
DRD-L01	Reports Required for Logistics
DRD-L02	Inventory Plan, Procedures, and Schedule
DRD-L03	Logistics Operations Manual
DRD-L04	Government Property Management Plan
DRD-L05	Financial Reporting Contractor Held Property

[74] *AOD tracks over 50,000 line items in the NAMIS parts catalog for supply. The aircraft logistics support function generates in excess of 160,000 requisitions, issue, receive, and return transactions per year, with a significantly higher number of system inquiries. Approximately 60 percent of the total number of parts is obtained from DoD sources. The Contractor obtains the remainder via local purchase. NAMIS interfaces to the NASA Integrated Enterprise Management Program (IEMP) System for financial accountability, the Defense Automatic Addressing System Office (DAASO) Automated Message Exchange System (DAMES) for requisitioning spares through DoD, and an interface with the Air Force's D043 master parts catalog. In addition, there is an interface between NAMIS and the Contractor's financial accounting system.*

[75] *Refer to contract Section J, Appendix J1 for DRD requirements.*

9.3 Functional Areas and Logistics Services

Category: FP

The Contractor shall provide the functional areas and logistics services listed below:

1) Inventory Management
    a. Material warehousing
    b. Stock control/replenishment
    c. Reverse posting of supply asset deliveries
    d. Stock rotation
    e. Supply issue points
    f. Deployment spares
    g. Other Kits
        i. Project kits
        ii. Aircraft change directive kits
        iii. NASA configuration kits
2) Cataloging
    a. Classification of parts
    b. Categorizing parts
    c. Tagging and labeling parts
    d. Grouping parts
    e. Environmental control requirements
3) Requisition processing for materials, parts, and services
    a. Public use aircraft
    b. Certificated aircraft
    c. NASA configuration items
4) Material Receipt Processing
    a. Material receiving
    b. General parts
        i. Pilferable item security
    c. Receiving inspections
    d. Functional checks
    e. Hazardous materials
        i. Chemicals
        ii. Explosives
    f. Special handling requirements
        i. Over-size deliveries
        ii. Rigging and heavy hauling support
        iii. Escorts
        iv. Premium transportation services
5) Material issue processing
6) Bench stock management and processing
7) Shop stock management and processing
8) Shelf-life management

9) Material/asset turn-in processing (DIFM)
10) Shipping, receiving and transportation processing, to include use of NASA aircraft
11) Inventory management
    a. Physical inventories
    b. Wall-to-wall inventories
    c. Contract transition inventories

9.4 Additional Logistics Support Services

9.4.1 Inquiries

Category: FP

The Contractor shall respond to inquiries for information such as part number verification, asset availability, inventory count of an individual item, part number/serial number searches, Government industry data exchange program (GIDEP) alert research and requests to physically view material within two (2) hours from initial request during normal work hours listed in SOW Subsection 4.1.2.

9.4.2 Acquisition

9.4.2.1 General

Category: FP

The Contractor shall provide procurement/subcontracting acquisition services. The Contractor shall procure when possible through the NASA, Federal, or DoD supply system.

9.4.2.2 Expedited Sub-Contracting

Category: FP

If requested by NASA, the Contractor shall obtain services or property on an expedited basis that requires the placement of a sub-contract/purchase order. The Contractor shall notify NASA on the status of the request within three (3) working days. Special attention should be paid to obtaining the appropriate Rights in Data, when requested by NASA. Refer to SOW Subsection 9.4.3 for warranty information on sub-contracts.

9.4.2.3 Local Purchase

Category: FP

The Contractor shall:

1) Utilize AOD Form 1307, *Purchase Request Worksheet*, for approval to purchase any item greater than $500. This form shall be utilized for all purchases of equipment, supplies and services including fabrication, training, and sub-contracting to support the AOD mission.
2) Obtain approval from CO or COTR prior to ordering any item containing a hazardous constituent.
3) Obtain prior approval from the CO or COTR for all commercial purchases greater than $10,000
4) Utilize the NASA Defense Priority and Allocation System rating of nine (9) for all commercial purchases.

9.4.2.4 DoD Requisitions

Category: FP

The Contractor shall:

1) Ensure funding is available for DoD Requisitions.
2) Transmit requirements to the Defense Automated Message Exchange System (DAMES) on a daily basis.
3) Ensure that NAMIS purchase order amounts are updated based on DAMES response showing the unit price for items that have been shipped.
4) Ensure retro-grade carcasses are returned within 30-days for each Expendability, Recoverability, Reparability Category (ERRC) "T" item requisitioned.
5) Reconcile DoD invoices, Military Standard Billing System (MILSBILLS) with actual orders and receipts in NAMIS. Utilize assistance from the NASA Disbursement Office as required.
6) Provide a five-year requirements data exchange list (RDEL) for all ERRC "T" items in accordance with AFMCMAN 23-1, Chapter 27, *Requirements for Secondary Items*.
7) Input Requirement Data Exchanges via the Defense Automatic Addressing System (DAAS) in accordance with AFMCMAN 23-1, Chapter 27, *Requirements for Secondary Items*.

9.4.2.5 Verification of Purchased Products

Category: FP

The Contractor shall establish and implement the inspection or other activities necessary for ensuring that purchased products meet specified purchase requirements in accordance with SAE AS 9110.

9.4.3 Warranty Program

Category: FP

The Contractor shall:

1) Provide any benefits to NASA that would accrue or be due from commercial warranties received with the purchase and repair of materials, parts, and equipment under this contract.
2) Ensure all sub-contracts/purchase orders contain warranties covering design and manufacturing requirements, defects in materials and workmanship, and essential performance requirements.

9.4.4 Property Control

9.4.4.1 Management of Controlled Equipment

Category: FP

The Contractor shall manage sensitive, controlled and functional property assigned to JSC and managed through the Property, Plant and Equipment (PP&E) System in accordance with JWI 4200.1, *Management of Controlled Equipment*.

9.4.4.2 Government Property

Category: FP

The Contractor shall manage, control, use, preserve, protect, repair, and maintain Government property in its possession in accordance with Federal Acquisition Regulation (FAR) Clause 52.245-1, *Government Property*. The Contractor shall prepare NASA Form 598, *Property Survey Report*, for any lost, damaged, destroyed, or stolen Government property in accordance with NPR 4200.1; *NASA Equipment Management Procedural Requirements.*

9.4.4.3 Control of Customer-Supplied Products

Category: FP

The Contractor shall control customer supplied products in accordance with AOD 33948, *Control of Customer-Supplied Products*.

9.4.4.4 Reparable Parts Center (RPC)

Category: FP

The Contractor shall establish a reparable parts center to:

1) Track reparable assets.
2) Maintain a due-in from maintenance (DIFM) system to include a repair processing center, which shall track all reparable assets from issue to return to supply.
3) Verify document and serial numbers, when applicable, for issued assets, transportation, and tracking of assets while in the repair cycle.

9.4.5 Shipping and Receiving

9.4.5.1 Export Compliance

Category: FP

The Contractor shall ship material OCONUS in accordance with all applicable laws and regulations to include export control in accordance with JWI 2190.1, *JSC Export Compliance*.

9.4.6 Material Processing

Category: FP

The Contractor shall:

1) Process material requests for items in stock within two (2) hours of initial request.
2) Process material request for items not in stock by close of business the day after the item is received in supply, unless the material falls under the priority receipt definition.
3) Process priority receipts on the same day the item is received. Priority receipts are defined as
    a. Hazardous Materials
    b. Communications security (COMSEC)
    c. Medical items or drugs
    d. Work stoppage items
    e. Receipts requiring special handling
4) Process routine receipts (items that do not meet priority receipt definition) no later than the second (2^{nd}) work day after receipt of item.

9.4.6.1 Identification, Handling, Storage, Packaging, Preservation and Delivery

Category: FP

The Contractor shall identify, handle, store, package, preserve, deliver, and ship products in accordance with JPR 1281.15, *Identification, Handling, Storage, Packaging, Preservation and Delivery* and USAF T.O. 00-85B-3, *How to Package Air Force Spares.*

9.4.6.2 Preparation and Processing of JSC Form 290, JSC Shipping Document

Category: FP

The Contractor shall coordinate Government bill of lading (GBL) for property that will be transported within CONUS or OCONUS (exported) to include commercial bill of lading (CBL) in accordance with JWI 6050.1, *How to Prepare and Process JSC Form 290, JSC Shipping Document*.

9.4.6.3 Packing, Handling, and Transportation for Aeronautical and Space Systems, Equipment, and Associated Components

Category: FP

The Contractor shall:

1) Utilize JSC Outbound Freight Logistics System (JOFLS) for the purpose of accounting and tracking all JSC shipments from receipt of items being shipped in accordance with NPR 6000.1, *Requirements for Packing, Handling, and Transportation for Aeronautical and Space Systems, Equipment, and Associated Components*.
2) Use reusable containers when practical for all items that require periodic shipment to and return from repair activities and where adequate provisions to control the containers make reuse economical in accordance with NPR 6000.1H, Paragraph 2.9, *Requirements for Packing, Handling, and Transportation for Aeronautical and Space Systems, Equipment, and Associated Components*.
3) Reuse packaging material to the maximum extent practicable in accordance with NPR 6000.1H, Paragraph 2.9, *Requirements for Packing, Handling, and Transportation for Aeronautical and Space Systems, Equipment, and Associated Components*.

9.4.6.4 Hazardous Material Shipments

Category: FP

The Contractor shall ensure that all shipments containing hazardous materials are packaged, packed, marked, labeled, and documented as appropriate, in accordance with the processes contained in:

1) Department of Transportation (DOT) Hazardous Materials Regulations in Title 49 CFR
2) International Civil Aviation Organizations (ICAO) Technical Instruction for the Safe Transportation of Dangerous Goods
3) International Maritime Organizations (IMO) Dangerous Goods Code
4) International Air Transport Association (IATA) Dangerous Goods Regulation

9.4.6.5 Reporting and Adjusting Discrepancies in Government Shipments

Category: FP

The Contractor shall ensure shipping discrepancies are resolved and freight claims are processed in accordance with Title 41 CFR, Chapter 135, Part 101-40, *Reporting and Adjusting Discrepancies in Government Shipments*.

9.4.6.6 Pyrotechnics Logistics Management

Category: FP

The Contractor shall:

1) Follow the provisions outlined in JPD 4500.1F, *Pyrotechnics – Logistics Management*. Example tasks include:
    a. Pick-up, control, store, issue, document, transport and dispose of JSC pyrotechnics in support of JSC AOD activity and crew survival pyrotechnics up to Class 1.3C.
    b. Establish and implement inventory controls to provide identification, traceability, and reporting of pyrotechnics.
    c. Maintain all records associated with explosive devices to meet all reporting requirements required by law and regulations. These records shall be made available within two (2) hours from initial request to the Government during surveillance audits and during the annual explosive handling certifications conducted by NASA personnel in accordance with JPD 4500.1, *Pyrotechnics – Logistics Management.*
2) Forecast pyrotechnic device replacement requirements for cartridge actuated devices (CAD) and propellant actuated devices (PAD) and place them on order to optimize quantity cost vs. shelf life.
3) Dispose of explosive devices in accordance with USAF T.O. 11A- 1-42, *General Instructions for Disposal of Conventional Munitions* and USAF T.O. 11A-1-60, *Inspection of Reusable Munitions Containers and Scrap Material*.

If service lives are to expire prior to replacement part delivery, then to preclude an aircraft/equipment being placed in a not mission capable (NMC) status pending receipt of a replacement item, the Contractor shall:

1) Determine if a service life extension is available via normal logistic support functions. If so, present proposed service life extension (SLE) and support data to NASA Engineering for review and approval.
2) Coordinate SLE's for pyrotechnic devices that are not readily available via normal logistic support functions with NASA Engineering.

9.4.6.7 Supply Discrepancy Reporting (SDR) Program

Category: FP

The Contractor shall report parts received from DoD and Commercial sources that are identified as defective or suspect as follows:

For DoD Parts:

The Contractor shall:

1) Report any part received from DoD that is identified as defective or suspect via the DoD Defense Automatic Addressing System Center (DAASC), WEBBASED Supply Discrepancy Reporting System (WEBSDR)[76]
2) Segregate parts reported under the WebSDR from normal stock pending disposition from DoD sources.
3) Conduct follow-up action on any SDR within thirty (30) calendar days from initial report submission.

For Commercial Parts:

The Contractor shall:

1) Report suspect or damaged parts under the Suspect Unapproved Parts (SUP) Program using FAA Form 8120-11, Sup Report.

9.4.7 Excess and Disposal

9.4.7.1 Excess and Disposal of Government Property

Category: FP

The Contractor shall:

1) Utilize the DoD Customer Asset Report (FTE) and Reply to Customer Asset Report (FTR) processes contained in NAMIS to report DoD excess supply stock and equipment requiring disposal prior to utilizing NASA procedures contained in JWI 4300.1, JSC *Instructions for Excess and Disposal of Government Property*.
2) Ensure products dispositioned for scrap are conspicuously and permanently marked, or positively controlled, until physically rendered unusable in accordance with SAE AS9110, *Aerospace Standard, Quality Maintenance Systems – Aerospace – Requirements for Maintenance Organization*.

[76] *Access to WebSDR may be obtained by completing an online system access request (SAR) from the DAASC website: https://www.daas.dla.mil.*

9.4.7.2 Handling and Disposal of Lithium Cells/Batteries

Category: FP

The Contractor shall receive and handle all lithium cells and batteries in accordance with the processes contained in JPR 8550.1, *JSC Environmental Compliance Procedural Requirements*.

9.4.8 Awaiting Parts (AWP) Disposition

Category: FP

The Contractor shall accomplish the following tasks if a DoD unserviceable end-item has been in an AWP status for sixty (60) days.

1) Contact the appropriate DoD Logistics Item Manager responsible for the piece parts or serviceable repairable unit (SRU) to get the most current status on the open requisition(s).
2) If delivery of the bits and pieces or SRU cannot be guaranteed within thirty (30) days, the Logistics Manager will contact the NASA Manager and request disposition of the end-item.

9.4.9 Warehouse Safety and Health

Category: FP

The Contractor shall maintain warehouse safety and health in accordance with processes contained in JPR 1700.1, *Safety and Health Handbook*.

9.4.10 Support Outside Normal Work Hours

Category: FP

The Contractor shall:

1) Assign an on-call support person in accordance with 5 CFR Section 551.431 outside the normal work hours listed in SOW Subsection 4.1.2, to provide logistics assistance to meet any of the services identified in SOW Subsection 9.0 of this SOW.
2) Support person shall arrive at EFD within 2-hours of initial request for assistance.

9.4.11 Deployment Support

Category: Cost

At Government request, the Contractor shall provide logistics personnel at deployed locations per SOW Subsection 4.9.2.

L9.0 Logistics – LaRC Center Unique

Category: Cost (SOW Subsections L9.1 through L9.4.11)

The requirements listed in SOW Subsections L9.1 through L9.4.11 shall apply to Langley Research Center.

L9.1 General

The Contractor shall provide logistics support services for the locations listed in SOW Subsection 2.2.2. The Contractor shall utilize the NASA Aircraft Management Information System (NAMIS) in accordance with SOW Subsection 4.11.1 of this SOW for all functional areas and processes required to support logistics.

L9.2 Deliverables – Logistics

SOW Subsection 9.2 not required.

L9.3 Functional Areas and Logistics Services

The Contractor shall provide the functional areas and logistics services listed below:

1) Inventory Management
    a. Material Warehousing
    b. Stock control/replenishment
    c. Reverse posting of supply asset deliveries
    d. Stock rotation
    e. Supply issue points
    f. Deployment spares
    g. Other Kits
        i. Project kits
        ii. Aircraft change directive kits
        iii. NASA configuration kits
2) Cataloging
    a. Classification of parts
    b. Categorizing parts
    c. Tagging and labeling parts
    d. Grouping parts
    e. Environmental control requirements
3) Requisition processing for materials, parts, and services
    a. Public use aircraft
    b. Certificated aircraft
    c. NASA configuration (modification) items
4) Material Receipt Processing

a. Material receiving
b. General parts
    i. Pilferable item security
c. Receiving inspections
d. Functional checks
e. Hazardous materials
    i. Chemicals
    ii. Explosives

5) Material issue processing
6) Bench stock management and processing
7) Shop stock management and processing
8) Shelf-life management
9) Inventory management
    a. Physical inventories
    b. Wall-to-wall inventories
    c. Contract transition inventories

L9.4 Additional Logistics Support Services

L9.4.1 Inquires

See SOW Subsection 9.4.1.

L9.4.2 Acquisition

See SOW Subsection 9.4.2.

L9.4.2.1 General

See SOW Subsection 9.4.2.1.

L9.4.2.2 Expedited Sub-Contracting

See SOW Subsection 9.4.2.2.

L9.4.2.3 Local Purchase

The Contractor shall:

1) Obtain LaRC Chief of Maintenance approval for all local purchases. This includes all purchases of equipment, supplies and services including fabrication, training, and sub-contracting to support the RSD mission.
2) Obtain approval from CO or COTR prior to ordering any item containing a hazardous constituent.
3) Obtain prior approval from the CO or COTR for all commercial purchases greater than $10,000
4) Utilize the NASA Defense Priority and Allocation System rating of nine (9) for all commercial purchases.

L9.4.2.4 DoD Requisitions

See SOW Subsection 9.4.2.4.

L9.4.2.5 Verification of Purchased Products

SOW Subsection 9.4.2.5 not applicable.

L9.4.3 Warranty Program

See SOW Subsection 9.4.3.

L9.4.4 Property Control

L9.4.4.1 Management of Controlled Equipment

SOW Subsection 9.4.4.1 not applicable.

L9.4.3.2 Government Property

SOW Subsection 9.4.4.2 not applicable.

L9.4.4.3 Control of Customer-Supplied Products

SOW Subsection 9.4.4.3 not applicable.

L9.4.4.4 Reparable Parts Center (RPC)

SOW Subsection 9.4.4.4 not applicable.

L9.4.5 Shipping and Receiving

L9.4.5.1 Export Compliance

SOW Subsection 9.4.5.1 not applicable.

L9.4.6 Material Processing

SOW Subsection 9.4.6 not applicable.

L9.4.6.1 Identification, Handling, Storage, Packaging, Preservation and Delivery

SOW Subsection 9.4.6.1 not applicable.

L9.4.6.2 Preparation and Processing of JSC Form 290, JSC Shipping Document

SOW Subsection 9.4.6.2 not applicable.

L9.4.6.3 Packing, Handling, and Transportation for Aeronautical and Space Systems, Equipment, and Associated Components

The Contractor shall:

1) Use reusable containers when practical for all items that require periodic shipment to and return from repair activities and where adequate provisions to control the containers make reuse economical in accordance with NPR 6000.1H, Paragraph 2.9, *Requirements for Packing, Handling, and Transportation for Aeronautical and Space Systems, Equipment, and Associated Components*.
2) Reuse packaging material to the maximum extent practicable in accordance with NPR 6000.1H, Paragraph 2.9, *Requirements for Packing, Handling, and Transportation for Aeronautical and Space Systems, Equipment, and Associated Components*.

L9.4.6.4 Hazardous Material Shipments

SOW Subsection 9.4.6.4 not applicable.

L9.4.6.5 Reporting and Adjusting Discrepancies in Government Shipments

SOW Subsection 9.4.6.5 not applicable.

L9.4.6.6 Pyrotechnics Logistics Management

SOW Subsection 9.4.6.6 not applicable.

L9.4.6.7 Supply Discrepancy Reporting (SDR) Program

The Contractor shall report parts received from DoD and Commercial sources that are identified as defective or suspect to the LaRC Chief of Maintenance.

L9.4.7 Excess and Disposal

L9.4.7.1 Excess and Disposal of Government Property

SOW Subsection 9.4.7.1 not applicable.

L9.4.7.2 Handling and Disposal of Lithium Cells/Batteries

SOW Subsection 9.4.7.2 not applicable.

L9.4.8 Awaiting Parts (AWP) Disposition

The Contractor ~~s~~hall accomplish the following if a DoD unserviceable end-item has been in an AWP status for sixty (60) days.

1) Contact the appropriate DoD Logistics Item Manager responsible for the piece parts or serviceable repairable unit (SRU) on order to repair the unserviceable item.

2) If delivery of the bits and pieces or SRU cannot be guaranteed within thirty (30) days, the Logistics Manager will contact the LaRC Chief of Maintenance and request disposition of the end-item.

L9.4.9 Warehouse Safety and Health

SOW Subsection 9.4.9 not applicable.

L9.4.10 Support Outside Normal Work Hours

The Contractor shall:

1) Assign an on-call support person in accordance with 5 CFR Section 551.431 outside the normal work hours listed in SOW Subsection L4.1.2, to provide logistics assistance to meet any of the services identified in SOW Subsection 9.0 of this SOW.

L9.4.11 Deployment Support

See SOW Subsection 9.4.11.

10.0 Quality Control

10.1 General Requirements

10.1.1 Overview

Category: FP

The Contractor shall provide quality control services. The Contractor's quality management system (QMS) shall be certified to the quality requirements of AS-9110, *Aerospace Requirements for Aircraft Maintenance Organizations* within one year of contract award.

The Contractor's quality management system shall, as a minimum, meet the following requirements:

1) Federal Acquisition Regulations (FAR) and NASA FAR Supplement
2) NASA JPD 1280.1, *Quality Policy*
3) NASA JPR 1280.2, *Quality Manual*

10.1.2 Deliverables – Quality

Category: FP

The Contractor shall provide the quality deliverables listed in Table 10-1.

Table 10-1: Data Requirement Description - Quality[77]

Data Requirement List (DRL) Item No.	DRD Title
DRD-Q01	Quality Management System Plan
DRD-Q02	Government industry data exchange program (GIDEP)

10.1.3 NASA Quality Assurance Evaluators (QAE)

Category: General

NASA QAE personnel are assigned to the Aircraft Operations Division (AOD), Aircraft Quality Assurance (QA) Branch. These personnel provide monitoring and surveillance of the Contractor using the elements outlined in the SOW and Contractor's Management Plan.[78]

[77] *Refer to Section J, Appendix J1 for DRD requirements.*
[78] *The Government reserves the right to conduct inspections on Government owned aircraft, engines, accessories, and other support equipment.*

10.1.4 Contractor Procurement Reviews

Category: General

The NASA Aircraft QA Branch will review all Contractor critical and high risk procurements for the application of quality and acceptance requirements in accordance with AOD 34100, *Maintenance Manual.*

10.1.5 Government Access

Category: General

The Contractor shall allow Government representatives access to work areas, data, provide support, and not interfere with the quality assurance evaluators (QAE's), State, Federal, and other designated personnel in the performance of their official duties.

10.1.6 Non-Conformances

Category: FP

The Contractor shall take corrective action for all non-conformances (not meeting contract requirements) identified during Government/Contractor surveillance/audits and provide corrective actions to the NASA CO and COTR in accordance with AOD 34100, *Maintenance Manual*.

10.1.7 Corrective and Preventative Action

Category: FP

The Contractor shall ensure that corrective and preventative actions include a corrective and preventive action plan that addresses why the performance threshold was not met to include root cause analysis, how performance will be returned to an acceptable level(s), and how recurrence will be prevented in the future.

10.1.8 Outsourced Processes

Category: FP

The Contractor shall ensure controls of outsourced (e.g. subcontracted) processes are identified within the scope of the Contractor's Quality Management System (QMS), in accordance with SAE AS9110, 4.1.

10.1.9 Deployment Support

Category: Cost

The Contractor shall provide quality control support for aircraft deployments per SOW Subsection 4.9.2.

10.2 Technical Library

Category: FP

The Contractor shall establish and maintain the Technical Library in accordance with AOD WI 34100, *Maintenance Manual*.

10.2.1 Aircraft Change Directives

Category: FP

The Contractor shall receive, review, and make recommendations to NASA on all Aircraft Change Directives (ACDs) via the use of AOD Form 1298, *Maintenance Instruction Tracking Form* in accordance with AOD WI 34100, *Maintenance Manual.*

10.2.2 Inquires to Repairs Not Supported by Approved Technical Data

Category: FP

The Contractor shall ensure all discrepancies discovered on aircraft and assigned equipment are repaired in accordance with approved technical data. In the event a discrepancy is noted and the repair is not supported by approved technical data, the Contractor shall take the following actions before Engineering (NASA or Contractor) is contacted for assistance:

1) The Contractor shall initiate a “down” discrepancy in the NAMIS database and subsequently contact/confer with their Contractor quality personnel to validate the repair requirement. The Contractor’s Quality Control Office shall serve as the monitor for these type anomalies and will ensure a valid request is warranted.
2) The Contractor Quality Control Office shall review supporting technical data to determine if the repair is not supported by approved technical data. NASA Quality Assurance may be contacted if assistance is deemed warranted.
3) Once the validation process is complete, the Contractor Quality Control Office shall bring the appropriate technical data researched to the NASA Maintenance Manager, along with the open “downing” discrepancy to discuss the not supported by approved technical data repair requirement.

Upon completion of Items 1-3 above, the NASA Maintenance Manager will:

1) Determine if the repair “is” or “is not” supported by approved technical data.
2) Update the down discrepancy in NAMIS to indicate that the repair “is” or “is not” supported by approved technical data.

10.3 Deficiency Reporting

Category: FP

The Contractor shall ensure that 10.3 deficiency reporting (DR) procedures for issue, turn-in, and storage are in accordance with T.O. 00-35D-54, *USAF Deficiency Reporting, Investigation and Resolution.* The DR shall be reported via the DoD web-based Joint Deficiency Reporting System (JDRS).

L10.0 Quality Control – LaRC Center Unique (Option 4 – See SOW Subsection 12.4.5)

Category: Cost (SOW Subsections L10.1 through L10.3)

The requirements listed in SOW Subsections L10.1 through L10.3 shall apply to Langley Research Center.

L10.1 General Requirements

L10.1.1 Overview

The Contractor shall provide quality control services. The Contractor's quality management system (QMS) shall be certified to the quality requirements of AS-9110, *Aerospace Requirements for Aircraft Maintenance Organizations* within one year of contract award.

The Contractor's quality management system shall, as a minimum, meet the following requirements:

1) Federal Acquisition Regulations (FAR) and NASA FAR Supplement

L10.1.2 Deliverables – Quality

SOW Subsection 10.1.2 not applicable.

L10.1.3 NASA Quality Assurance Evaluators (QAE)

SOW Subsection 10.1.3 not applicable.

L10.1.4 Contractor Procurement Reviews

SOW Subsection 10.1.4 not applicable.

L10.1.5 Government Access

SOW Subsection 10.1.5 not applicable.

L10.1.6 Non-Conformances

SOW Subsection 10.1.6 not applicable.

L10.1.7 Corrective and Preventative Action

SOW Subsection 10.1.7 not applicable.

L10.1.8 Outsourced Processes

SOW Subsection 10.1.8 not applicable.

L10.1.9 Deployment Support

See SOW Subsection 10.1.9.

L10.2 Quality Technical Library

The Contractor shall establish and maintain the Quality Technical Library in accordance with RSD Quality Assurance Office established procedures.

L10.2.1 Aircraft Change Directives

The Contractor shall receive, review, and make recommendations to NASA on all Aircraft Change Directives (ACDs).

L10.2.2 Inquires to Repairs Not Supported by Approved Technical Data

SOW Subsection 10.2.2 not applicable.

L10.3 Deficiency Reporting

SOW Subsection 10.3 not applicable.

11.0 Safety

11.1 General Requirements

11.1.1 Overview

Category: FP

The Contractor shall develop, maintain, and execute a safety program in accordance with NASA JPR 1700.1, *JSC Safety and Health Handbook*.

11.1.2 Deliverables – Safety

Category: FP

The Contractor shall provide the safety deliverables listed in Table 11-1.

Table 11-1: Data Requirement Description - Safety[79]

Data Requirement List (DRL) Item No.	DRD Title
DRD-S01	Environmental Health Program Plan
DRD-S02	Safety and Health Plan, JSC & LaRC
DRD-S03	Safety and Health Program Self Evaluation
DRD-S04	Monthly Safety and Health Metrics

11.1.3 Workplace Health and Safety

Category: FP

The Contractor shall:

1) Enforce Occupational and Health (OSHA) (Public Law 91-596) Guidance, USAF technical orders (T.O.), and other DoD and aircraft manufacturers prescribed processes/procedures to ensure the safety of their personnel.
2) Resolve safety and health issues as they arise.

[79] *Refer to Section J, Appendix J1 for DRD requirements.*

11.1.4 Deployment Support

Category: Cost

The Contractor shall provide safety support for aircraft deployments per SOW Subsection 4.9.2.

11.2 Hazards

Category: FP

The Contractor shall incorporate Operational Risk Management (ORM) within the workplace. This includes the identification, elimination or control, and documentation of hazards to minimize risk associated with uncertainty in the decision-making process. Additional guidance can be found in AFI 90-901, *Operational Risk Management,* and Air Force Pamphlet 90-902 (AFPAM 90-902), *Operational Risk Management Guidelines and Tools.*

11.2.1 Job Hazard Analysis (JHA)

Category: FP

When written directives do not identify hazards for tasks being performed, the Contractor, with assistance from NASA and Contractor's safety offices, shall complete a job hazard analysis (JHA). Procedures for JHA's are contained in JPR 1700.1, *JSC Safety and Health Handbook* and ASO WI 33901, *Job Hazard Analysis.*

11.2.2 Hazardous Materials

Category: FP

The Contractor shall follow established guidelines for handling hazardous materials in accordance with JSC JPR 1700.1, Section 9, *JSC Safety and Health Handbook*.

11.3 Safety Programs

11.3.1 Voluntary Protection Program (VPP)

Category: FP

NASA, Johnson Space Center, Aircraft Operations Division, is a VPP STAR organization.

The Contractor shall support the VPP four main program elements identified below:

1) Management Commitment and Employee Involvement
2) Workplace Analysis
3) Hazard Prevention and Control
4) Safety and Health Training

11.3.2 Confined Space Entry Program

Category: FP

The Contractor shall:

1) Conduct confined space entry in accordance with JPR 1700.1, *JSC Safety and H*ealth Handbook, Chapter 6.10.
2) Verify confined space training is current (no more than two (2) years old) for all personnel, including subcontractors, repairing NASA AOD aircraft on NASA property prior to the commencement of any work.

11.3.3 Hazardous Materials and Hazardous Waste Management Program

Category: FP

The Contractor shall ensure a Hazardous Material Control and Management Program (HAZMAT) is established, maintained, and enforced in accordance with the NASA Center HAZMAT Program as depicted in JPR 1700.1, *JSC Safety and Health Handbook.* Example program items include:

1) Hazardous material use
2) Disposal
3) Handling
4) Transportation
5) Long term and work site storage
6) Incident reporting

11.3.4 Radiation Safety Program

Category: FP

The Contractor shall ensure a Radiation Safety Program is established, maintained, and enforced in accordance with JPR 1700.1, *JSC Safety and Health Handbook*, USAF T.O. 33B1-1, *Nondestructive Inspection Methods* and Air Force Manual (AFMAN) 48-125, *Dosimetry Program*.

11.3.5 Facility Emergency Preparedness Program

Category: FP

The Contractor shall establish emergency action procedures aligned with NASA response plans for disaster control and severe weather in accordance with JPD 1040.2, *JSC Emergency Preparedness Program.*

11.3.6 Aircraft Mishap Interim Response Program

Category: FP

The Contractor shall:

1) Develop an interim response program to support NASA in responding to aircraft mishaps, injuries, fuel spills, environmental contamination, and weather damage to support JWI 1040.27, *JSC Emergency Preparedness Plan, Appendix 5 – JSC Aircraft Mishap Plan*
2) Provide the NASA COTR and CO with an up-to-date list of qualified response team members

11.4 Mishap and Incident Response

11.4.1 Mishap and Close Call Reporting

Category: FP

The Contractor shall:

1) Report mishaps and close calls (flight and ground) in accordance with NPR 8621.1, *NASA Procedures and Guidelines for Mishap and Close Call Reporting, Investigating, and Recordkeeping,* NPR 7900.3, *Aircraft Operations Management Manual*, *and* AOD 34100, *Maintenance Manual.*
2) Immediately notify the NASA Operations Duty Officer of mishaps regardless of date and time.
3) Notify the Contracting Officer of mishaps within 48 hours
4) Coordinate close call reporting with the NASA Safety Office
5) Ensure all equipment (aircraft, engines, and support equipment) involved in the close call or mishap is impounded in accordance with AOD 34100, *Maintenance Manual* to ensure a thorough investigation into the root and causal factors can be conducted without altering the mishap scene.

11.4.2 Mishap and Close Call Investigation

Category: Cost

The Contractor shall:

1) Support mishap investigations when requested by NASA.
2) Ensure mishap investigation support is in accordance with NPR 8621.1, *NASA Procedures and Guidelines for Mishap and Close Call Reporting, Investigating, and Recordkeeping* and NPR 7900.3, *Aircraft Operations Management Manual.*
3) Ensure personnel assigned to investigate mishaps are trained per SOW Subsection 4.8.3.3.7.

11.4.3 Mishap Interim Response

Category: Cost

The Contractor shall support mishap interim responses in accordance with JWI 1040.27, *JSC Emergency Preparedness Plan, Appendix 5 – JSC Aircraft Mishap Plan*.

11.4.4 Crash Trailer

11.4.4.1 General

Category: FP

The Contractor shall

1) Maintain NASA's aircraft emergency response trailer and the equipment maintained therein at Ellington Field (EFD).
2) Maintain an AFTO Form 244; Industrial/Support Equipment Record, for the trailer.
3) Ensure that a sufficient number of personnel are familiar with the technical data maintained in the crash trailer in accordance with JWI 1040.27, *JSC Emergency Preparedness Plan, Appendix 5 – JSC Aircraft Mishap Plan*, to support emergency response in the event of an aircraft mishap.

11.4.4.2 Crash Trailer Periodic Maintenance

Category: FP

The Contractor shall:

1) Inspect the crash trailer every one-hundred-eighty (180) days in accordance with CC-WD-G6; *SE Inspection Program.*
2) Conduct a wall-to-wall inventory every three-hundred-sixty-five (365) days of the crash trailer contents listed in JWI 1040.27, *JSC Emergency Preparedness Plan, Appendix 5 – JSC Aircraft Mishap Plan* on an annual basis. The inventory will include inflation of all aircraft lift bags in accordance with established technical data/OEM maintenance manuals.
3) Track and document inspections in the NAMIS database.

11.4.5 Facility Disaster Recovery and Restoration

Category: Cost

The Contractor shall assist the Government in disaster recovery and restoration of facilities in accordance with JWI 1040.17, *JSC Emergency Preparedness Plan, Annex M – Recovery Plan.*

L11.0 Safety – LaRC Center Unique

Category: Cost (SOW Subsections L11.1 through L11.4.5)

The requirements listed in SOW Subsections L11.1 through L11.4.5 shall apply to Langley Research Center.

L11.1 General Requirements

L11.1.1 Overview

The Contractor is responsible for following and maintaining all LaRC safety requirements and policies.

L11.1.2 Deliverables – Safety

See SOW Subsection 11.1.2.

L11.1.3 Workplace Health and Safety

The Contractor shall:

1) Enforce Occupational and Health (OSHA) (Public Law 91-596) Guidance, USAF technical orders (T.O.), and other aircraft manufacturers prescribed processes/procedures to ensure the safety of their personnel.
2) Resolve safety and health issues as they arise.

L11.1.4 Deployment Support

See SOW Subsection 11.1.4.

L11.2 Hazards

The Contractor shall incorporate Operational Risk Management (ORM) within the workplace. This includes the identification, elimination or control, and documentation of hazards to minimize risk associated with uncertainty in the decision-making process.

L11.2.1 Job Hazard Analysis (JHA)

SOW Subsection 11.2.1 not applicable.

L11.2.2 Hazardous Materials

The Contractor shall follow established guidelines for handling hazardous materials in accordance with LaRC and RSD policy.

L11.3 Safety Programs

L11.3.1 Voluntary Protection Program (VPP)

NASA, LaRC is a VPP STAR Center.

The Contractor shall support the VPP four main program elements identified below:

1) Management Commitment and Employee Involvement
2) Workplace Analysis
3) Hazard Prevention and Control
4) Safety and Health Training

L11.3.2 Confined Space Entry Program

SOW Subsection 11.3.2 not applicable.

L11.3.3 Hazardous Materials and Hazardous Waste Management Program

SOW Subsection 11.3.3 not applicable.

L11.3.4 Radiation Safety Program

SOW Subsection 11.3.4 not applicable.

L11.3.5 Facility Emergency Preparedness Program

The Contractor shall establish emergency action procedures aligned with NASA LaRC response plans for disaster control and severe weather.

L11.3.6 Aircraft Mishap Interim Response Program

SOW Subsection 11.3.6 not applicable.

L11.4 Mishap and Incident Response

L11.4.1 Mishap and Close Call Reporting

The Contractor shall:

1) Report mishaps and close calls (flight and ground) in accordance with NPR 8621.1, *NASA Procedures and Guidelines for Mishap and Close Call Reporting, Investigating, and Recordkeeping,* NPR 7900.3, *Aircraft Operations Management Manual, and* LMS-OR-0939, *Aviation Accident Reporting, Investigation, and Site Management Plan*.

2) In the event of a maintenance related mishap/incident, report immediately to the NASA Chief of Maintenance and/or NASA Director, Research Services Directorate. Flight related mishaps shall be immediately reported to the LaRC Aviation Safety Officer and Director, Research Services Directorate.
3) Notify the Contracting Officer of mishaps within 48 hours
4) Coordinate close call reporting with the NASA Safety Office
5) Ensure all equipment (aircraft, engines, and support equipment) involved in the close call or mishap is impounded to ensure a thorough investigation into the root and causal factors can be conducted without altering the mishap scene.

L11.4.2 Mishap and Close Call Investigation

The Contractor shall:

1) Support mishap investigations when requested by NASA.
2) Ensure mishap investigation support is in accordance with NPR 8621.1, *NASA Procedures and Guidelines for Mishap and Close Call Reporting, Investigating, and Recordkeeping* and NPR 7900.3, *Aircraft Operations Management Manual*.

L11.4.3 Mishap Interim Response

SOW Subsection 11.4.3 not applicable.

L11.4.4 Crash Trailer

L11.4.4.1 General

SOW Subsection 11.4.4.1 not applicable.

L11.4.4.2 Crash Trailer Periodic Maintenance

See SOW Subsection 11.4.4.2 not applicable.

L11.4.5 Facility Disaster Recovery and Restoration

The Contractor shall assist the Government in disaster recovery and restoration of facilities.

12.0 SOW Options

12.1 Option 1 – Technical Publications and Document Management Services

Category: Cost

The Contractor shall provide technical publications and document management services. Example tasks include:

1) Provide research and consult with subject matter experts to generate technical publications that accurately reflect the current configuration of aircraft and support equipment so that the aircraft and equipment can be properly maintained and operated.
2) Ensure document and data control is in accordance with AOD 34100, *Maintenance Manual*.
3) Provide process verification to ensure the technical completeness of each document.
4) Ensure that current publications are made accessible to NASA as soon as possible so that NASA can perform maintenance and operations using the most up-to-date information available.
5) Provide increased accessibility to technical publications through the creation, conversion, and availability of electronic publications on the AOD Web site.
6) Ensure consistency of technical publications in terms of format, structure, terminology, use of color, and literary elements (e.g. voice and person).
7) Provide documentation life cycle management:
    a. Support the full life cycle of AOD technical publications, from requirements definition to final delivery including project management, quality assurance, and configuration control.
8) Provide document life cycle tracking:
    a. Track the status and location of all documents that are under development or are in the review and approval cycle, and provide this information to AOD management, as required, including the time each document has been under review by each reviewer.
9) Work with organizations outside of AOD, such as NASA Headquarters, the JSC Information Resources Directorate (IRD), the Center Directives Management System (CDMS), the JSC Quality Management System (QMS), and the Scientific and Technical Information Center (STIC) to publish forms and documents with affectivity outside of AOD.
10) Act as the custodians for AOD and maintain the AOD/Flight Crew Operations Directorate (FCOD) Safety Office master list in a current status to accurately reflect AOD's technical publications.
11) Maintain AOD-produced JSC internal documents and JSC Work Instructions (JWI) in accordance with identified directives.
12) Ensure that electronic/hard copy deliverables and archived records are managed and maintained in accordance with identified files and records management and procedures.
13) Develop and implement the necessary processes and procedures for the NAMIS Work Cards System documentation at AOD, from initial concept to final delivery to:
    a. Convert work cards from their existing format into the Work Cards System

b. Maintain Work Cards System documentation.

12.2 Option 2 – Spaceflight Parachute Assembly Services

Category: Cost

The Contractor shall provide spaceflight parachute assembly inspecting, testing, buildup, repairing, and packing services.

12.3 Option 3 – Security Services

Category: Cost

The Contractor shall provide security services per NASA request. Examples of security services support include:

1) Provide support to programs and projects requiring Special Security Officer (SSO) support.
2) Provide development and management of program/project security guides, classification guides, document marking, safeguarding, and procedures
3) Provide development, management, and operations support for secure facilities
4) Provide development and implementation of policies, instructions, procedures, control systems, and methods
5) Manage personnel access controls and assists with security education
6) Transmit, transfer, downgrade, and destroy information
7) Support personnel security, communications security, physical security, COMSEC, information security, and information systems security

12.4 Option 4 – Langley Research Center Support

12.4.1 LaRC – Pilots

Category: Cost

See SOW Subsection L6.3.5.

12.4.2 LaRC – Aviators Life Support Systems and Equipment Maintenance

Category: Cost

See SOW Subsection L7.4.2.

12.4.3 LaRC – Egress Systems

Category: Cost

See SOW Subsection L7.6.5.

12.4.4 LaRC – Engineering

Category: Cost

See SOW Subsection L8.0.

12.4.5 LaRC – Quality Control

Category: Cost

See SOW Subsection L10.0.